RAILROAD GAZETTE

FRIDAY, SEPTEMBER 22, 1876.

Carlile's Seismagraph.

The instrument of which we give engravings on the present and opposite pages has for its object the record of shocks received by, or the oscillations produced in, any vehicle, such as a locomotive or railway carriage when in motion. It is the invention of Mr. H. Carlile, Memb. Inst. C. E., and managing director of the Dunaburg Vitebsk Railway, and has been designed by him chiefly for making periodical records of the state of the permanent way on that line. When used also on *different* vehicles run over the same portion of line, it also becomes a means of checking the relative steadiness of the motion of these vehicles, a use to which it can be applied with great advantage. Its action depends upon the inertia of a weight suspended in space by an elastic medium attached to a point of support. If such point be shifted suddenly in any direction, the suspended body, from its inertia, retains for a moment its original position—after the point of suspension has been shifted—and only gradually takes up the new position due to it through the alteration in the position of the point of support, but with an amount of force varying according to the distance through which, and the velocity with which, the point of suspension has been disturbed.

If by means of a mechanical arrangement this force be rendered available for moving a pencil at right angles to a straight line, which the pencil, when at rest, is describing on a strip of paper, the pencil will make a corresponding mark, and there is at once a record gained of the movements of the point of support referred to. It is only necessary, then, to attach the point of support to the vehicle, the oscillations of which are to be investigated; and to provide that the strip of paper shall travel at any certain rate, corresponding either to that of time, by means of clockwork, or to that of the velocity of the vehicle, by means of an arrangement put in motion by the wheels of the vehicle, and a diagram will be formed, which not only shows the various oscillations of the vehicle, but points out the time when, or the place where, such oscillations took place.

Our engravings, Figs 1 and 2, on the present and following pages, represent two perspective views of this instrument, taken from opposite corners. The instrument is generally carried in a strong box, to the bottom of which it is firmly fixed, but which has in this instance been removed, so as to expose the instrument completely to view.

A is a strong cast-iron plate, about 13 in. by 12 in. in size, which forms a base upon which the different parts of the instrument are fixed, and which can be screwed to the bottom of the box above referred to; *B* a firm upright of cast iron, firmly screwed to the base-plate *A*; *C* is a brass cylinder containing a mass of lead, and attached to a light brass barrel, *D*. This barrel is suspended at one end by means of a strong ring, *Q*, riveted on to it, which works in the universal joint *E*, the four screws forming the axes of wheels which are shown at *F*. The weight *C* and the barrel *D* are turned true to one axis, and have another point of support at *G*, where, through means of a pin fixed in the weight and carrying a cross lever, to the ends of which are attached the spiral steel springs *H*, which again are hung from the end of the straight steel spring I, attached firmly by means of four adjusting screws *K* to the upright *B*, the weight and barrel are suspended, so as to be free to move in any direction, round the universal joint at *E*. In the centre of the weight, and firmly attached to it, is a projection *I*. (Fig. 1) furnished with a hole extending into it, in the line of the axis of the weight and barrel. This projection moves with the weight, but limits its movement by means of the metal ring *M*, within which the projection plays, and which is concentric with the axis of the weight when the latter is at rest.

The ring is firmly attached to the base-plate *A*. The amount of play it allows to the weight is about 1¼ in. in every direction from the axis, and which is sufficient for showing oscillation of ordinary character. At *N* there is a strong pin attached to the end of a short lever, which, by means of the spindle *O* and the handle *P*, can be inserted into the hole in the centre of the projection *L*, so as to lock the weight and prevent any movement in it when the instrument is not being used.

In Fig. 1 the weight is at rest, but in Fig. 2 it has been depressed, so that the projection (*L* in Fig. 1) is in contact with the lower part of the ring *M*. The ring *Q* (Fig. 2) is turned out at the end remote from the weight *C*, so as to form an annular flat surface of about ¼ in. in width, and 2¾ in. outside in diameter. When the weight is in its normal position of rest, this annular surface lies in the same plane as the centers of the four screws *F*, which belong to the universal joint. It is therefore evident that, whatever motion be given to the weight about the universal joint, the one half of the annular surface will be turned at a corresponding angle in the direction towards *C*, and the other half, at the same angle, in the direction away from *C*. This annular movement is taken up and converted into a longitudinal one by means of the steel disc R (Fig. 2), which always presses against the flat annular surface in the ring *Q*. This disc R is mounted on a spindle, which is supported at the one end, *S*, on the rocking lever *T*, and at the other plays in a hole in a support, which extends from the base-plate at *U* into the body of the barrel *D* through a hole cut in its lower side, sufficiently large to admit of free play of the barrel without its coming into contact with the support. The centre of the disc and its spindle coincide with the axis of the weight and barrel when at rest.

For every movement of the weight the disc receives a motion in a line passing through the pin in the rocking lever at *S*, and the hole in the support within the barrel, which line is, although not quite straight, yet sufficiently so for practical purposes. The disc *R* is kept pressed against the annular surface in the ring by means of the steel spring *V*, which is attached to and turns on the axle *W*, and communicates its pressure to the head of the disc spindle *S*, and can be adjusted by the set-screw *X* (Fig. 1), connected with the index and graduated arc *Y*, to regulate the pressure against the annular surface as desired, and in this way make the instrument more or less sensitive to oscillation.

Interposed between the head of the disc spindle *S* and the lower end of the spring *V* is the rounded head of the lever *Z*, which turns the perpendicular axle *a*, and so communicates motion to the lever *b*. The lever *b* has a slotted hole at its extremity, in which works a screw *r* for attaching the lever to the connecting rod *c*, which gives motion to the arm *d* carrying a pencil *e*. The arm *d* is mounted on the perpendicular axis *f*, which is surrounded and moved by a spiral spring, so as to bring it back to its original position each time it has been moved by the connecting rod *c*. The object in having the slotted hole in the extremity of the lever *b*, which is attached to the connecting rod *c*, is to be able to adjust the arm *d*, so that it shall either show *all* the oscillations indicated by the weight moving. The box containing the instrument requires merely to be placed on the floor of the carriage, etc., the oscillations of which are to be tested.

Should it be required to register the vertical oscillations only, the box must be placed so that the axis of the weight and barrel shall be at right angles to the line of the direction of the vehicle, and, to prevent any lateral oscillation which might occur to the weight, two wooden blocks, *t* and *u* (Fig. 2), are to be placed one on each side of the weight *C*.

These blocks allow a slight play to the weight, and are furthermore each mounted with a piece of leather to decrease any friction between them and the weight. By adjusting the set-screw *g* the slight lateral motion thus allowed to the weight will not be shown in the diagram. The degree of sensibility of the instrument required is then adjusted by the screw *X*.

The roller *l* and the clock *p* being set to the time of day, and the clockwork put in motion by the lever *o*, the weight *C* is unlocked by the lever *P*, and the instrument is in operation. The time the clock commences to go must be marked on a strip of paper, and, on the completion of the diagram, the time can be further marked at such intervals as may be thought proper.

We have at present before us a series of ten diagrams of the oscillations of locomotives which have been taken with the instrument just described. These diagrams are not of a nature that could well be reproduced by an engraving unless that engraving were made the full size of the originals; and as this would occupy far more space than we could spare we must describe the diagrams verbally. They have all been taken over the same portion of line of rails, and within the course of six consecutive days, so that, as far as the permanent way is concerned, it may be assumed that all things were equal. The instrument was in each case placed over one of the trailing wheels of the locomotive tried. The word "station" marks the beginning and the end, and the arrow the direction of the journey. The dates are also given. The time taken to perform the journey is marked at the bottom of the diagram, the figures representing the time of day in hours and minutes. In the diagrams, 1 to 9 inclusive, both vertical and lateral oscillations are shown; diagram 10 shows vertical oscillations alone. The degree of sensibility of the instrument, and the limit of oscillation not recorded, are the same in all cases. The average speed of the locomotives during the journey is also mentioned on each diagram. The train taken was in every case the same, and weighed 79 tons.

Diagrams 1, 2 and 3 show the oscillations of a six-wheel goods engine, run at the speeds of 20 miles, 21.95 miles, and 27.56 miles an hour respectively. This engine has wheels 4 ft. 7 in. in diameter; they are all coupled, and one pair of them is behind the fire-box. The engine is of the ordinary English type of goods locomotive, with inside cylinders; it is adapted for goods trains of moderate speed, and has a wheel base of 15 ft. 5 in. These diagrams show very strikingly the effect of the increase of speed in producing oscillation. A nearer examination of them shows also that the same parts of the road have always been instrumental in producing, at the different speeds, similar lines of oscillation, though the oscillations are shown different in amount. The greatest amount of oscillation has taken place at about the middle of the time occupied by the journey, which would, under ordinary circumstances, correspond with about the half-way point between the end stations.

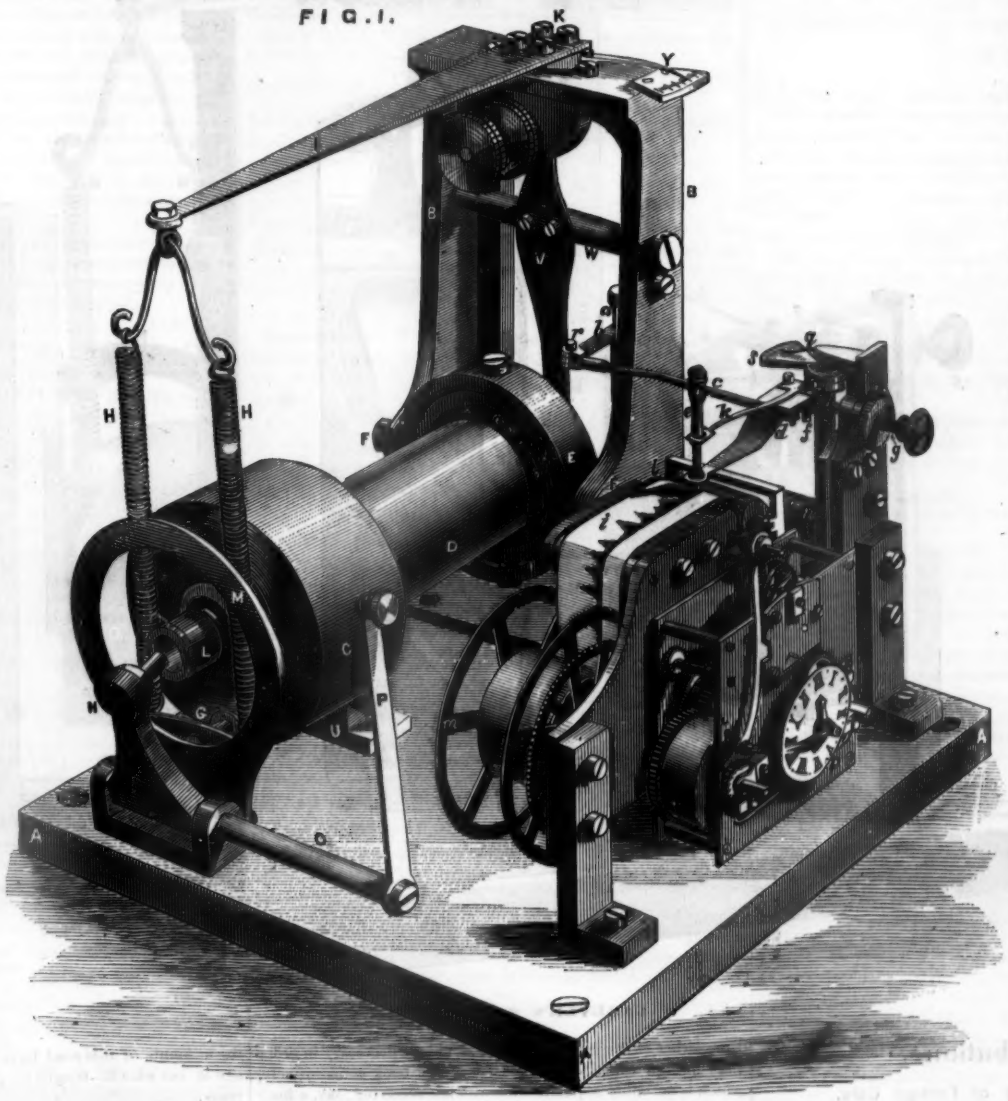
Diagrams 4 and 5 show the oscillations of another class of goods engine, viz., a slow-speed engine of the German and Russian type. It has six wheels coupled, 4 ft. in diameter, and all the wheels are placed in front of the fire-box, the wheel base measuring 11 ft. 3 in. The speeds of the engine were 13.33 miles (its normal speed) and 22.22 miles an hour respectively. A comparison between Diagram No. 2, taken at a speed of 21.95 miles per hour, and Diagram No. 5, taken at speed of 22.22 miles per hour, shows that in this case the short-wheel-based engine from which the latter diagram was taken had an advantage as regards steadiness, particularly at points where curves were traversed. In the absence, however, of *very* precise information as to the respective state of repair of the two engines, and concerning other points in the design beyond the mere position of the wheels, it would be impossible to deduce absolutely definite conclusions from this result.

Diagram 6 is taken from an engine of a very similar type to that which afforded the last-mentioned diagrams 4 and 5, but with this particular exception, that the height of its boiler above rail level (5 ft. 6 in.) is about 1 foot less than that of the boiler of the other engine.

The diagram shows scarcely any oscillation at all, except near the middle of the journey, where there has evidently been a bad place in the road. It may be here stated that the gauge of the railway upon which these experiments were made is 5 ft. Of course it is not professed that this diagram shows *all* the oscillations made by the engine. In this, as in all the other diagrams, all small oscillations up to one and the same limit are left out, as only tending to complicate the figures.

Diagram 7 shows that, as is well known, for steady working a locomotive must be not only well designed, but kept in good order. The diagram is taken from a locomotive of exactly the same type and make as that which afforded diagram 6, both locomotives being run at practically the same speeds, viz., the former at 13.4 and the latter at 13.33 miles an hour. In the former locomotive, however (as was also the case with all the locomotives excepting that), the diagram of which is now being dealt with, the wheels, and in fact all the parts, were in thoroughly good condition; but in this one the wheels were in

FIG. 1.



CARLILE'S SEISMAGRAPH.

C, or only such parts of them as exceed a certain limit, which limit can be assumed at pleasure.

The necessary adjustment here is effected by means of the set-screw *S*, the end of which presses against a stud *h* on the arm *d*, so as to move the connecting rod *c* towards the lever *b*, thus moving the screw *r*, which connects both connecting rod and lever, out of contact with the lever, and enabling it to traverse such distances as may be thought proper, without producing any movement in the connecting rod and the pencil. To regulate this adjustment with accuracy, there are an index, *q*, which is fixed, and a graduated arc, *s*, attached to the arm *d*.

The strip of paper *i*, upon which the pencil is pressed by means of the spring *k*, is moved in the present instance by a system of rollers and clockwork. One of these rollers, *l*, makes a complete revolution in five minutes, marking on the paper every minute by one prick, and every five minutes by two pricks of a needle point. This roller has its motion communicated to it by the clock through a spring friction arrangement, to enable the roller to be moved by hand in adjusting the paper, if necessary, without interfering with the going of the clock. The paper is delivered by the roller *n*, which is loose, and is rolled up by the roller *m* driven by a clockwork of its own. The small lever *o* is for putting the clock and paper in motion, and stopping them when required. The clock *p* gives the time of day. The paper used in this instrument is 1¼ in. wide, but otherwise similar to that used for Morse's telegraphic apparatus.

In order to make use of the instrument, it must first be decided whether it is to show all oscillations, *i. e.*, vertical and horizontal, or the vertical ones only. In the former case the instrument must be placed, as shown in Fig. 1, with the axis of the weight and barrel in the direction in which the vehicle is

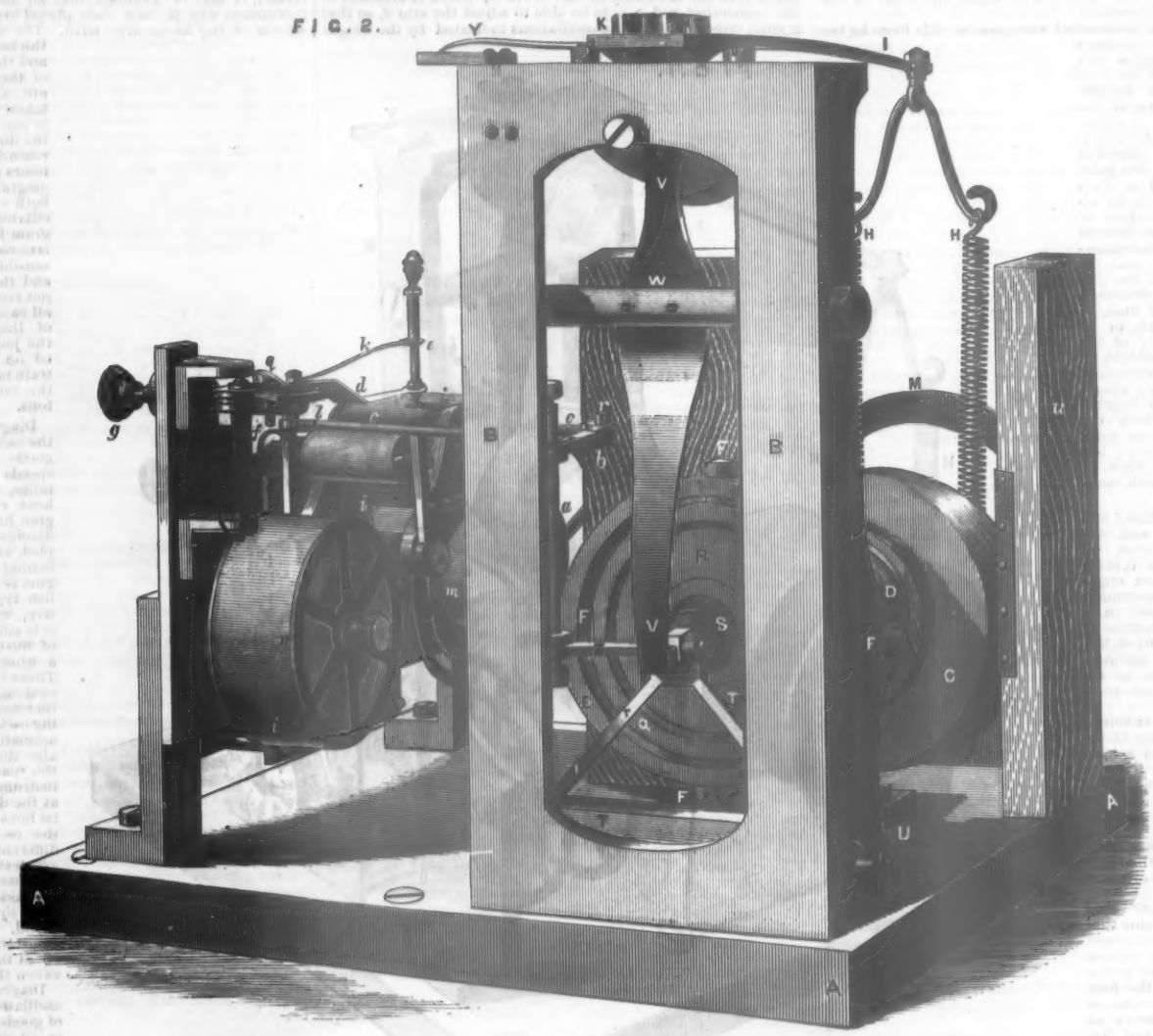
bad condition, owing to defects in the tyres. This locomotive was generally not in good working order, and was destined for the repairing shops.

Diagram 8 shows the oscillation of a locomotive of the mixed goods and passenger class, with outside cylinders, four coupled driving wheels, one pair of them behind the fire-box (diameter of these wheels 5 ft. 6 in.), also a pair of leading wheels 3 ft. 6 in. in diameter. The wheel base of this engine is 14 ft. The speed here was about the nominal one, viz., 29.26 miles an hour, and the oscillation is, as will appear further on, chiefly *lateral*.

Diagram 9 shows the oscillation of the same engine, running at a speed of 32.4 miles an hour, and diagram 10 those of the same engine running at 33.8 miles an hour. In this case, however, the instrument was adjusted to show *vertical* oscillations only. The diagrams 8, 9 and 10 are uncommonly like each other as to the positions of the oscillations, and might almost be taken for one and the same diagram drawn to their different scales, showing, however, that not only, as is exemplified in diagrams 8 and 9, does speed play a most prominent part in producing oscillation in a locomotive; but, as appears from the diagrams 8, 9 and 10, the instrument has been faithful to its record of the oscillation to which the engine was subjected, either through its own action or the inequalities of the road.

We trust that experiments may be made with Mr. Carlile's "seismagraph" on some of our English lines, and if so we shall probably have something to say concerning the results. Used with judgment and care the instrument is capable of affording very valuable information, and its details have been well worked out.—*Engineering.*

FIG. 2.



CARLYLE'S SEISMAGRAPH.

Contributions.

Reporting Mileage of Foreign Cars.

CLEVELAND, O., Sept. 9, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Aug. 25 I noticed a letter from "G. C. B." in relation to "Mileage of Foreign Cars," and as this is a branch of railroad accounts that receives very little attention, I ask the privilege of expressing my views on the subject.

Mileage of cars is a very important account in railroad business, and one of such nature that connecting lines are obliged to rely on each other's integrity for just credits, as there are no means of ascertaining whether they are correct. Freight-car movements and mileage should be checked as closely, and corrections made, as in any freight or ticket account, in order to return a true and honest car-service report; hence it is important that each road should have a system of keeping mileage accounts that will insure accuracy, as errors are frequently made which are to their loss.

Very few superintendents or auditors give this branch the attention it deserves, or have any idea of the labor and difficulty in rendering a true and just car-service account, as this department is generally limited in its help.

The account is made up in various ways: on some roads it is computed by the conductor and simply condensed by the auditor without any examination as to whether they are crediting some foreign road with their own cars or the contrary. This is very frequently done, as conductors rely mostly on the car number for its initial, and the transposition of a figure would cause such an error. Conductors may also fail to report, in which case of course the mileage would be lost. Another method is from station agents' reports; by entering in a record book the arrival of the car, on the supposition that it comes from the station at which it was last reported. Should it be left on a siding, or at a non-reporting station, record and mileage are both lost. Still another method is by computation from way bills. This is not correct, as, from various causes, such as transfers, wrecks, etc., cars do not always go to the points billed to, neither is the correct and full initial of the car always given on the way bill, hence that mileage is quite doubtful. This last method I consider very incorrect; in fact, none of them are what they should be on a well-managed road.

The proposition advanced by "G. C. B.," mileage of each car separately, is an excellent one, and should be made use of by all roads, as it will be found of benefit aside from the information given the Master Car-Builder in regard to wheels, etc., but the great obstacle is clerical help, stationery and expenses incident. I have examined the form of blanks submitted by "G. C. B." and do not clearly see how such a form of mileage book could be used on a large road composed of several smaller roads or divisions, where each is to be kept separate from the others. I see no way other than to have a book for each division, with a column for each car, for you *may* have any car from either of the connecting lines. This is necessary in order that foreign cars may be placed in the book consecutively, which is certainly requisite when you are receiving, say, a hundred cars daily from each of several companies, and have them in such order that they may be transferred consecutively to the blank which goes forward to the company owning the cars. If entered daily and at random, as they are received, in a short time there will be duplicate columns, or a great loss of time, which can be ill afforded, in finding its last entry. Also, what prevents entering one of your own cars, of this same number, in this same column if the conductor should err in his initials, and what check have you on all the additions, which, on a large road would be very numerous? Both of these points are very essential in rendering an accurate account, and economy in labor and stationery are the chief points to be aimed at. The question is, how can this problem of *accurate* and *honest* returns be solved. I can see no other way, and have it economical to each company, than to have all roads adopt the same system and form of reports; establish clearing houses in each State, which shall report to each other at the close of each day the movements and mileage of cars belonging to their respective lines, and to the Auditor of each road in that State, monthly, the mileage of its cars on all foreign lines as received from other clearing houses, and to the Master Car-Builder the total mileage of each car. This brings the report in better shape than if made up by each company separately, as the summing up of each car on the different roads in the month would be a task.

The advantages to be gained by this plan are many. Each road could rely on an accurate car-service account; the monthly report to Auditor would show mileage on all roads; the stationery used to register each company's cars on its own road would answer for the whole State; and the work can be done with less clerical help than by each one separately. The establishment of a clearing house would also do away with the practically useless expense of "lost car" agents. The expenses of the clearing house to be borne by all the roads in proportion to their equipment. Train-report blanks, etc., to be furnished by each road as required. With the clearing houses in operation the movements of each company's cars over all the railroads in the United States could be given at less cost than at present over its own road.

It may be asked where a system complete enough to answer all requirements may be found? I will say that the system at present in use on this road is so arranged that all the above-mentioned wants can be supplied with perfect accuracy, and, I think, with as little clerical force as by any system in use. The only correct way of obtaining this result is from the running record of the car, and the mode in which we treat the conductors' reports and register the cars covers all chances of error. In this system the mileage is computed on two entirely different plans, hence the results must be correct. And as far as my experience goes, it is adapted to meet all points likely to be asked for.

I would say, for the information of "G. C. B.," or others, that the accounts of this road have been in shape to give the mileage of car wheels—freight or passenger—during the past two years.

A. W. D.,
Atlantic & Great Western Railroad.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your correspondent "G. C. B." in his letter which appeared in the *Gazette* of Aug. 25, does railroad companies a great injustice when he insinuates that roads who do not report the mileage of each foreign car separately either do not or do not wish to report it honestly; the real reason being that, as yet, with scarcely two or three exceptions, they have not become convinced of the necessity of keeping a separate mileage account of *each* of their *own* cars, and therefore they neither ask it from nor render it to other roads. I believe, however, that a special request for such a separate account, which, by the way, is the present mode of reporting "fast freight line" cars, would generally be attended to.

Nearly all Western roads have adopted some system of car *recording*, by which the daily movement of home and foreign cars can at any time be traced. One book is usually kept for home cars and one for foreign, the entries in which are made either from daily reports furnished by every agent on the road, or from the conductors' train reports. I have tried both methods, and find that by the latter there is a great saving of time, but by the former the records can be kept up more closely.

Obviously, the mileage can be made up from these record books for each car separately, and for any period; but I have no hesitation in stating, that the making up of such a separate mileage account for every car in use, whether home or foreign, would occupy at least three times the time that is needed to

make up the mileage from the conductors' reports direct, taking account only of the ownership of the cars and not of their separate numbers.

I enclose a blank form of our "Freight Conductor's Report," from which you will see that the back is printed and ruled so as to enter upon it the total number of loaded and the total number of empty cars, and the total mileage of the loaded and the total mileage of the empty cars, both of our own road and of each road whose cars were in the train. The mileage of any number of cars in the train, of the same ownership and going from and to the same stations, is calculated and entered together instead of separately, which effects a great saving of time, and the endorsements on these reports also furnish all the information necessary for showing the total number of loaded and empty cars (with their total respective mileages) moved during the month, the average mileage per car, the average number of loaded and empty cars per train, and the average car mileage per train. These conductors' reports are numbered consecutively for each month, and in a book kept for that purpose, the total mileage due the various other roads, as endorsed on the reports, is *entered up from time to time during the month.*

Now I think there is as much *honesty* and *correctness* in this mode of making up the mileage of foreign cars as in the separate system advocated by "G. C. B." Still I am far from undervaluing the advantage of knowing what mileage the wheels of various manufacturers will sustain; but for all practical purposes, I should think, if a few designated cars were not allowed to leave the road, and the mileage of those cars ascertained, as it could be from such a book as the record of the movement of cars, already referred to, a sufficient test would be obtained. The great desideratum in all such matters is, to obtain such information as is really needed for all practical purposes, with the least possible labor and expense. It may perhaps be useful to some of your readers if I state that the record books adopted on the road with which I am connected are those copyrighted by Mr. F. M. Luce, formerly Car Recorder of the Toledo, Wabash & Western and now of the Chicago & Northwestern Railway.

Let me kindly say to "G. C. B.," don't again abuse your railroad *confreres* and think of them as dishonest, because they don't at once adopted some system that you particularly desire. Give us your opinions and experience like a friend.

J. P. W.

[The form of freight conductor's car report referred to is of the size of a letter sheet, with the usual three folds, on the first fold of which are printed the title and spaces for conductor's three brakemen's, engineer's and fireman's names, and for number and name of engine, together with the instructions for filling out the report.

Over the rest of this side of the sheet is the general head:

GOING NORTH.

Left —— Station at —— m. —— 187—
Arrived at —— Station at —— m. —— 187—
N. B.—A Loaded car is one that contains Freight in any quantity, more or less.

There are below this general head eight columns, with the following heads:

Letters or Initials of Foreign Cars. See Instructions.
No. of each Car and Caboose.
Kind of Car.
If empty, mark X; if loaded, with what.
Where Taken.
Where Left.
Destination and remarks.
Miles run.

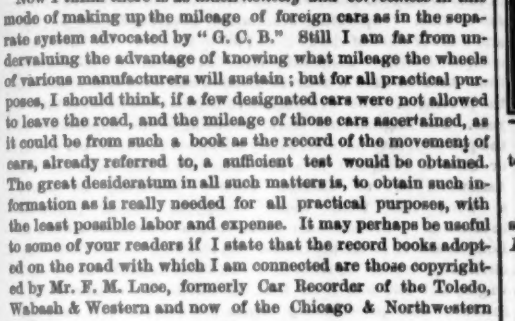
Two-thirds of the reverse of the sheet is identified with the above, but the other fold has a form of recapitulation, with columns for number of empty cars, miles run, number of loaded cars and miles run to be filled opposite the initials of the principal connections of the line.—EDITOR RAILROAD GAZETTE.]

The Subject of Deflection.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. P. Winkle, C. E., at the end of his amusing and interesting article in the *Railroad Gazette* of September 8, asks: "What is the correct deflection?"

I will try to explain my own method of computation. The



problem is to find the exact deflection of the canti-lever truss fig. 1, whose length, $l = 80$ ft., is divided into 8 panels. Its depth is 8 feet, and it is loaded at the end with ten tons $= w$.

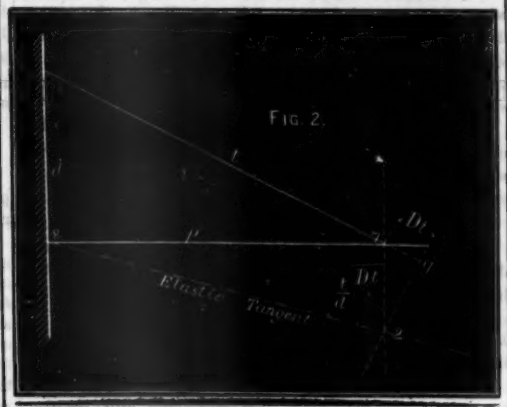
The sections a of the chord pieces, bottom as well as top, are assumed to contain 20 square inches each, which corresponds with a maximum strain of five tons per square inch.

The diagonals t have equal strains and equal sections, $= 3.6$ tons, which brings their strains per square inch to 4.2 tons.

The section of the posts is not given by our friend, though the last post P^7 is not without influence on the deflection. It may be called $a_2 = 3$ square inches (strain iper square inch $= 3\frac{1}{3}$ tons),

What Mr. Winkle terms the "elastic tangent" is due to the influence on deflection of the diagonal nearest to the wall, the influence of all other diagonals being *nothing*. That this is the case can be proved easily by calculating the sum of the alterations of the three angles around any lower joint.

This sum of alterations of angles—as far as due to the extensions of the equally long diagonals of equal sections and equal model—being nothing, no deflection accrues from this source. The diagonal t_1, however, at o causes a deflection, f.



The extension of this diagonal being Dt, the deflection due to it at point 7 will be found

$$= Dt \times \frac{t}{d},$$

since point 7 will move down to z, $7 - g$ being the extension Dr, and the line $7 - z$ being made perpendicular to $8 - 7$.

For 8 panels there will be

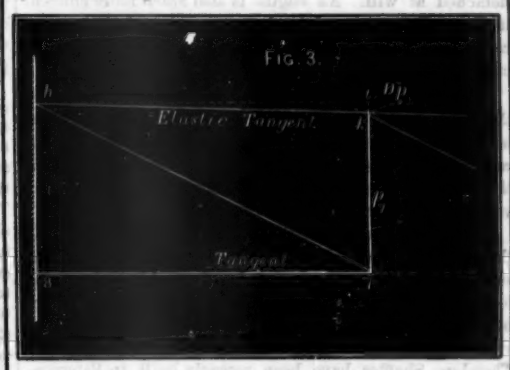
$$f = 8, \frac{t}{d} \times Dt.$$

Now since Dt equals the length of the tie t multiplied by its strain per square inch and divided by *the* model (12,000 tons $= M.$), there is:

$$f = 8 \times \frac{t}{d} \times \frac{w}{a_1} \times \frac{t}{d} \times \frac{t}{E} = 8 \frac{wt^3}{9 a_1 d^2 E} = 0.73 \text{ in.}$$

The next cause of deflection is the *end post* P^7, which is not considered by our friend nor by "professorial engineering.' All other posts, for the same reasons as the ties, cause no deflection.

The deflection due to P^7 may be termed g and can be found by reference to fig. 3.



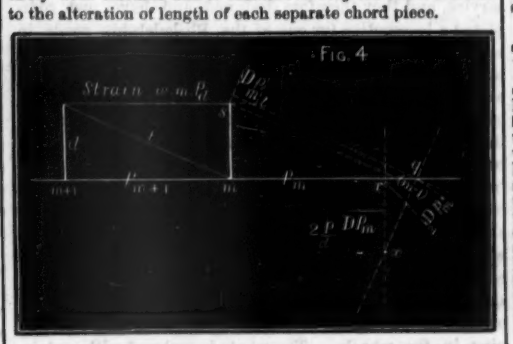
Consider all other lengths unchanged and draw the triangle hk^7 with the altered end post $7k$, ik being the alteration,

$$Dp = \frac{wdl}{a_2 E}$$

This triangle shows that the top chord hi will move into the direction hk, which is another elastic tangent. This tangent tells from joint 6 to joint 0 and brings the deflection

$$g = 7Dp = 7 \frac{wdl}{a_2 E} = 0.19 \text{ in.}$$

The chords cause the bulk of the deflection of our girder. For the sake of exactness, it will be necessary to dispense entirely with calculus and to examine *directly* the deflection due to the alteration of length of each separate chord piece.



Of our figure 4, the chord pieces $m\,g$ and $n\,s$ are strained equally, and if m is the index of the joint under consideration, the strains will be

$$w \times \frac{m\,p}{d},$$

and the extension or compression will equal

$$\frac{w}{a} \times \frac{m\,p}{d} \times \frac{p}{E}.$$

The extension of the top chord would cause s to advance to point t, and point $(m-1)$ to recede to r, $r-(m-1)$ and $s\,t$ being equal. By fixing point q so that $t\,q =$ diagonal t, and by drawing triangle $r\,q\,z$, the point $(m-1)$ will be found to have moved to z, so that $r\,z =$ the deflection

$$= 2\,D\,P \frac{m-1}{m} \times \frac{p}{d}.$$

This deflection at the end of the truss will tell m times, hence this deflection is equal to

$$m \times 2 \times P\,m \times \frac{p}{d} = 2\,m \frac{W\,m\,p}{a\,d} \times \frac{p}{E} \times \frac{p}{d} = 2\,m^3 \frac{W p^3}{a\,d^2 E}.$$

There is an expression like this at every joint from 1 to 7, and we get, therefore:

$$\frac{2\,w\,p^3}{a\,d^2 E} \times (1 + 2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3) = 280 \frac{w\,p^3}{a\,d^2 E}.$$

For the compression of the last chord $p8$, we only get

$$\frac{w\,p^3}{a\,d^2 E} \times 8^3.$$

Hence the total deflection due to the chord pieces is—

$$\Delta = (280 + 64) \frac{w\,p^3}{a\,d^2 E} = 2.70 \text{ inches.}$$

The total deflection of the truss will be—

$$f + g + \Delta = 0.73 + 0.19 + 2.70 = 3.62 \text{ inches,}$$
of which 0.92 is due to the web, and
2.70 " " chords.

The usual theory neglects the web and, treating the truss, or rather the chords, by the formula developed for a solid beam of uniform section, gives only the deflection—

$$\Delta = \frac{2}{3} \frac{w\,p^3}{a\,d^2 E} = 2.67 \text{ inches.}$$

The neglect of the web, therefore, amounts to

$$\frac{0.95}{2.67} = 35.6 \text{ per cent.,}$$

so that our friend Winkle is right when he says:

"It is, that if his calculation comes within 30 per cent. of the actual deflection, there is something wrong with his figures."

With the usual formula, the influence of the chords is found pretty nearly correct, the difference being only 3-100ths of an inch, or about one per cent., while Mr. Winkle's formula would differ from the corrected value of this deflection $3.17 - 2.70 = 0.50$ in., or by 18½ per cent.

This would show that it is not well to apply the calculus to a formula directly derived from the finite change of form of a panel. The difficulty is that we do not know precisely between *what* limits to integrate the final equation in case of a truss of only a few (here 8) panels. ENGINEER.

What is the True Deflection?

TO THE EDITOR OF THE RAILROAD GAZETTE:

I recommend to the earnest attention of P. Winkle, C. E., the following "sportive" mathematical exercise:

Assume that	$x = 1$
Then multiply by x,	$x^2 = x$
Subtracting 1 from each side,	$x^2 - 1 = x - 1$
Factoring,	$(x + 1)(x - 1) = x - 1$
By division,	$x + 1 = 1$
and, as $x = 1$, therefore	$2 = 1$

Query.—Which is right, 2 or 1, or x?

In a truss 80 feet long, 8 feet deep and of 8 panels, the cross section a of either the upper or lower chord is 20 square feet, and the cross section of the web ties is 3.6 square feet! These are exceedingly convenient numbers, but did P. Winkle, C. E., ever calmly reflect upon the deflection of his "elastic tangent" when the ties have a cross section of 0.00000007 square feet? If this be considered, lo! his mathematics become still more "sportive." And again, his attempt "to obtain the deflection without recognizing the neutral axis," although it may deceive him and others, deceiveth not BERNOULLI.

A Needed Improvement in Sleeping Car Berths.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The recent accident on the St. Louis, Kansas City & Northern Railway, at which the Treasurer of that road and some other passengers lost their lives by reason of the "shutting up" upon them of the upper berth in which they were sleeping, should induce the Pullman Palace Car Company to take at once the necessary steps, by some efficient appliance, to prevent the possibility of such a horrid fate to any passengers. Surely some simple means can be devised to insure the rigidity of the berths, even after the spring gets loose, at some point where the passenger can get out; and every one of the hundreds of the Pullman coaches should have the upper berths secured in that manner without a moment's delay. T.

Train Wrecking.

The man George E. Adams, whose exploits as a train wrecker we recently chronicled, was tried last week in the court at Erie, Pa., on the charges of wrecking the train on the Lake Shore road at Northeast. He pleaded guilty, and when brought up for sentence his counsel offered to put in evidence of previous good character in mitigation of sentence. The Judge, however, declined to receive it. Adams himself, on being asked if he had anything to say, said that he had not intended to wreck the train, but expected to flag it and secure a place on the road as a reward. The Judge commented on the gravity of the offense, and said that he could not see any mitigating circumstances. He would punish him to the full extent of the law, as he would any one else who might be hereafter tried before him for the same crime. He then sentenced Adams to pay a fine of $100 and costs and to be imprisoned in the Penitentiary for ten years at hard labor.

A New Oil Tank Car.

Mr. H. G. Brooks has devised a new oil tank car, one of which he is now building at the Brooks Locomotive Works, at Dunkirk, N. Y. It is thus described by the Dunkirk *Journal:*

"The car is built with a hollow platform of iron, on which is suspended a tank lying between the trucks and utilizing that space; the tank and hollow space in the platform, which is a part of the tank, will together hold the same quantity of oil as the oil cars now in use. Above this may be built a box car, cattle car, or simply a platform, as the use of the road may require."

The oil tank cars now in use can be used for nothing but oil and consequently must be returned empty. The new car is intended to avoid this and is adapted to carry return loads of almost any kind.

RAILROAD GAZETTE

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CONTENTS:

Editorial Announcements.

PASSES.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

ADDRESSES.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

ADVERTISEMENTS.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

CONTRIBUTIONS.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

STEAM ON STREET RAILROADS.

Among the many good results which have attended the Centennial Exhibition is the breaking down of the prejudice, or superstition rather, which has existed against the use of steam on street railroads. The immense numbers of people who must be carried to and from the Exhibition in Philadelphia have completely gorged the street railroads, and the manner in which passengers are packed into horse cars every morning and evening in that city would do credit to those who "put up" sardines or herrings for market. For the reason that the facilities which could be provided for the transportation of the people who wanted to be carried were entirely insufficient for the demands, the people and the authorities in Philadelphia were inclined to look for relief to the use of steam instead of relying entirely upon horse power. The City Council was therefore induced to grant the privilege to some or all of the horse car companies to use steam power, and permitted the Pennsylvania Railroad to run trains down Market street to Fifteenth. Several of the horse car companies are experimenting with various forms of engines, some placed in the cars themselves and others detached. On some of the suburban roads the old Grice & Long steam cars have now been used for ten or twelve years. These cars have a four-wheeled truck under the back end, and one, and in some cases two, pairs of wheels with rigid axles attached to the car body under the front end. An engine with a vertical boiler is placed in the front end of the car, and a pair of cylinders is connected to an intermediate shaft which is geared with suitable cog-wheels to the driving axle. The difficulty with these engines is that, owing to the great length of the wheel base and the rigidity of the driving axles, the engines run around short or even long curves with great difficulty. The fact, however, that they have been used successfully for so many years is undoubtedly a strong argument in their favor.

In order to overcome the difficulties of the rigidity of the driving axles, Mr. Woodbury, of Boston, about ten years ago, designed and had built a car with two trucks. The engine and boiler were located on the front one, and were arranged so as to turn with the truck, the car body being attached to the truck by a large ring which surrounded or embraced the boiler, which was vertical. This ring rested on friction rollers on the truck. This arrangement allowed the truck to turn independently of the car body, and of course allowed the axles to adjust themselves to the curvature of the road, or in other words gave greater flexibility to the wheel-base than was possible with the arrangement of Grice & Long. This car was experimented with in Boston and the vicinity, and also in the suburbs of Brooklyn soon after it was built, but for some reason—probably the want of practical knowledge of the construction of locomotive engines by those who built or designed it—it never seemed to meet with much success, and wherever it was tried it soon fell into disuse. Since that time the inventor died, and now, we are told, his executors have sent one of the cars to Philadelphia, and it is now running on one of the roads there, with what success we are not able to report.

About a year ago the Baldwin Locomotive Works became interested in the question and constructed a four-wheeled car with an engine at the front end, which we described at the time.

This engine was experimented with in Philadelphia for a little time until finally the city authorities threw such obstacles in the way of its use there that it had to be withdrawn and was sent to Brooklyn, where it was used for some months, but, we believe, was finally taken back by the manufacturers for the very good reason that the parties who used the car failed to pay for it.

During the past year quite a number of attempts of various kinds have been made in Philadelphia, and besides those mentioned several other steam cars have been tried and are in use with more or less success.

The problem of working steam on street roads has thus far been almost entirely in the hands of persons inexperienced in the construction of locomotive engines. It has been a very inviting field for immature engineers and scheming inventors, and they have pertinaciously clung to the idea of combining steam power with the vehicle for carrying passengers. This is open to a number of very grave objections. In the first place, the heat and the steam and smell from the boiler and machinery, being so very near to the passengers, is a very great annoyance; and secondly, if the engine gets out of order and must be laid up for repairs, the car must be laid up, too, and if the car gets out of order the engine must be laid up. The combination of the engine with the car also takes away much of the simplicity which may exist if the engine and car consist of two separate vehicles or units which can be coupled together or detached at will. An engine is also much more efficient if it can be employed to draw any car, and *vice versa*, a car will perform more service if it can be coupled to any engine than if the two are inseparable.

For these reasons many of those who have examined this subject carefully, and from a practical point of view, have concluded that the best kind of engine for street railroad service is the simplest possible form of locomotive, constructed so as to be entirely independent of the vehicle which carries the passengers.

In New Orleans locomotive engines which are run with the steam from water heated to a very high temperature in stationary boilers and carried in a suitable tank on the locomotive, and which is charged from the stationary boilers, have been used for several years past.

Several of these engines of improved design, by Mr. Theodore Sheffler, have been recently built in Paterson, and shipped to New Orleans, but we have as yet received no report of their operation.

Quite recently we published an engraving of a French locomotive for street cars. This, it will be remembered, is a simple four-wheeled engine, inclosed by a very neat cab and coupled to an ordinary car.

Since what may be called the Centennial discussion of the subject, the managers of the Baldwin Locomotive Works have given fresh attention to the subject, and they have come to the conclusion stated above, that an engine independent of the car is very much better for this or any service, and they therefore designed and have just completed a locomotive for one of the Philadelphia roads in some respects similar to the French engine. It has four wheels 30 in. in diameter spread 5 ft. 6 in. from centre to centre, with a vertical cylindrical boiler and vertical cylinders 6 in. in diameter and 10 in. stroke. Between the two axles is an intermediate crank shaft. The boiler is not placed centrally between the two axles but nearer to what we will call the front axle, so as to leave room enough behind the boiler for the intermediate shaft. Over this shaft is a cast-iron stand or frame, on which the two inverted cylinders are placed. These are connected to the two middle cranks of the intermediate shaft below. The latter has also a crank on each end, outside of the frames, and is connected to ordinary crank-pins in the wheels. The whole is inclosed with a plain cab, which gives abundant room for the runner and for coal and water. The weight of the whole engine in working condition is estimated to be about 10,000 lbs. A similar engine, but with 8×10 in. cylinders, for one of the Baltimore roads was nearly completed a few days ago. It is made somewhat heavier, owing to the steep grades in the city where it is intended to work.

These engines are, we believe, more promising of success than any other attempt in this direction has thus far been. They are in the hands of people who have some accurate knowledge of the effect of the law of gravitation on the operation of locomotives, and who can do more than guess at the steam-generating capacity of a boiler and of the proportions which one part of the machine should bear to another—information of which most of the schemers who have worked at this problem have been profoundly ignorant. Then, too, there is more hope of success if engines of this kind are built by good mechanics than if the workmanship on them is a sort of universal botch. We therefore expect to hear very soon of the successful use of steam power on street railroads, with a general expression of surprise on the part of everybody at the fact that it was never done before.

Wages on English and German Railroads.

The *Journal* of the German Railroad Union publishes a comparative table of the pay of English and Prussian government railroad employes, from which we compile the following:

What are known in Prussia as "railroad secretaries," together with bookkeepers, cashiers, etc., have a yearly salary of $450 to $825 per year, with an allowance for house rent from $45 to $135. "Operating secretaries" get from $472.50 to $735, and a lower class of clerks from $435 to $622.50. All these are compared with "assistant clerks" in England, who receive from $208 to $416 a year in London and from $182 to $390 in the provinces. The Prussian clerk begins with at least $400 a year. The English chief clerk, according to the importance of the position, may have his salary advanced to $12.50 per week, or $650 a year, and in a few cases this is increased to $750. Assistants out of London receive uniformly 50 cents a week less than those occupying similar positions in London. "Probationary clerks" begin with $2.50 a week in London and $2 in the provinces. On entering the service every clerk must deposit as security a sum twice as great as a year's wages, and not less than $500, on which the company pays interest. The probationary clerks are examined in reading, writing from dictation, the four rules of arithmetic, and in weights and measures. Assistant clerks must have a complete knowledge of commercial arithmetic, including decimals, and be qualified to write from dictation rapidly and correctly, in a good business hand. In England, clerks can begin to serve when but 16 years of age; in Prussia, most of the permanent appointments are confined to men not less than 30, after 12 years of military service, and the earliest age for civil supernumeraries is 18 years. Employees of all offices, including the ticket, baggage and freight departments, are called "clerks" in England, and also all cashiers, and in part the station employes, so that all the higher employments, except those of the construction and machinery departments, come from their ranks, the preparation for which is acquired in the "clerk's" position.

Continuing the comparison, it appears that regularly appointed office assistants in the Prussian service get $225 to $337.50 per year, and those not regularly appointed $225; the foremen of freight shipments and the station cashiers $735 to $885, the freight shipping clerks and receiving cashiers of stations $510 to $772.50; the baggage-masters, $472.50 to $547.50. The English equivalents of these are among the clerks noticed above. Other Prussian employes receive: Station master of first-class, $622.50 to $885; of second-class, $542.50 to $622.50; assistant station master and station overseer, $472.50 to $542.50; telegraph operator and switchmen who can telegraph, $322.50 to $397.50; switchmen, $262.50 to $322.50; track guards, $225 to $247.50; train conductor, $322.50 to $397.50 (increased to $384 and $459 by a mileage allowance): baggage-man, $363 to $378; train foreman, $294 to $347; brakeman, $270 to $344; loading-master, $322.50 to $360; yard-master, $322·50 to $360; foreman laborer in car switching, $192 to $275; assistant in switching, $146 to $228; locomotive runner, $435 to $585; fireman, $285 to $360.

With these are compared the following English employes:

Station inspectors, passenger department, $455 to $520 in London and $325 to $455 in the provinces, with dwelling free of rent; the same, freight department, $390 to $780 in London and $390 to $455 in the provinces, also with free dwelling; signalmen, $283 to $403; pointsmen (who attend the switches), $260 to $312; gatemen at street or road crossings, $247 to $273 in London and $221 to $273 out of it; passenger and freight train guards, $286 to $390; brakemen, $273 to $300; ticket collectors, $273 to $312 in London and $260 to $300 in the provinces; boy ticket collectors, $221 to $247 in London and $190 to $221 in the provinces; baggage labelers and cloak-room porters, $286 to $325; upper foremen porters, $351 to $390 in London and $312 to $338 in the provinces; ordinary foremen porters, $312 to $351 in London and $273 to $300 in the provinces; foremen engine shunters, $351 to $390 in London and $312 to $351 in the provinces; engine shunters, $286 to $325; assistant engine shunters, $273 to $312; engine drivers, $480 to $550, with allowance for clothing; firemen, $275 to $313, with allowance for clothing.

A second-class of uniformed staff receive the following wages: Signal learners and carriage couplers, for the first year $4.75 per week, and rising 25 cents a week to $5.50 in the fourth year and thereafter. Lampmen begin with $4.50 a week and rise in the same way to $5 in the third year and thereafter; while lamp foremen, who begin with $6, get $6.75 the fourth year and after. "Parcel porter's" pay varies from $4.75 to $6.25 a week; passenger porters begin at $4.25 and rise to $5. If the porter is also a "number-taker," he gets 25 cents a week more than an ordinary porter. In the goods department, porters get from $4.50 to $5.25 in London and from $4 to $4.75 out of it.

A "plate-layer" (trackman) is paid 70 to 85 cents a day, a "foreman plate-layer" 83 to $1.10; foremen in locomotive shops, $2.45 to $3.70; foremen in car repair shops, $2.25 to $2.45; an engine cleaner 75 to 85 cents per day.

On the Great Western Railway the oldest and most deserv-

ing enginemen, who run the express trains, are paid $2.35 a day, with a yearly addition of $50. These make the round trip between London and Bristol (119 miles each way) six times from 6:45 Monday morning till 4:30 Sunday morning.

With these are compared the German officials with daily pay as follows: Switchman and coupler, 40 to 62 cents; chief switchman, 52 to 75 cents; station laborer, 32 to 62 cents; foreman laborer, 42 to 70 cents; laborer on superstructure, 35 to 55; foreman of such laborers, 42 to 62; shop workmen, 46 to 80; engine cleaners, 40 to 65 cents; foreman cleaner, 47 to 72 cents.

In England the station masters at the great stations sometimes receive as much as $1,000 a year, not including coal and gas for their domestic use (which it is common to allow on the Continent). The uniformed staff generally is paid fortnightly. On some roads signalmen who have served faithfully and accurately receive a yearly gratuity of $12½ to $25. They serve from 8 to 12 hours daily and usually have one Sunday out of three.

The Grain Movement for Twenty Weeks.

The shipments of grain of all kinds from the eight principal Northwestern markets for each week since April 22 have been, in bushels, by lake and by rail:

Week ending—	By lake.	By rail.	Total.	Per ct. by rail.
April 29	1,634,541	2,072,946	3,707,487	56
May 6	2,445,191	2,292,633	4,737,824	48½
" 13	1,538,526	2,302,940	3,841,466	60
" 20	1,602,170	2,016,304	3,618,474	56¼
" 27	1,747,408	1,820,456	3,567,864	51
June 3	2,412,162	1,797,922	4,210,084	42¾
" 10	2,894,915	2,147,670	5,042,585	42½
" 17	2,921,405	2,391,811	5,313,216	45
" 24	2,728,706	2,198,054	4,926,760	44¼
July 1	1,821,155	1,784,548	3,605,703	49¾
" 8	1,765,010	1,205,184	2,970,194	40¼
" 15	1,648,508	1,228,678	2,877,186	42⅝
" 22	2,269,336	1,032,825	3,302,161	31½
" 29	1,466,502	1,038,208	2,504,710	41½
Aug. 5	2,055,243	1,283,268	3,338,511	38½
" 12	1,744,059	1,300,720	3,044,779	42⅝
" 19	2,150,292	1,614,256	3,764,548	42⅝
" 26	2,352,152	1,520,811	3,872,963	39¼
Sept. 2	1,698,491	1,573,058	3,271,549	48½
" 9	2,374,473	1,818,411	4,192,884	43½
Total for 20 weeks	41,270,245	34,440,703	75,710,948	45½

The total shipments are positively large, the largest since June, and exceeded in but five weeks out of the twenty. Both the vessels and the railroads profit by the increased shipments, the former most, though lake rates are higher. The shipments of wheat for the last week were so considerable (1,206,000 bushels) as to indicate that at last the last crop has begun to move.

For the same 20 weeks the receipts at the different Atlantic ports have been:

	Corn.	Per cent. of total.	All grains.	Per cent. of total.
New York	12,460,353	30.4	33,923,724	44.0
Boston	4,463,037	10.9	5,931,914	7.7
Portland	396,200	1.0	744,070	1.0
Montreal	2,175,533	5.3	8,259,718	10.7
Philadelphia	10,492,350	25.6	14,661,900	19.0
Baltimore	9,410,700	22.9	11,441,985	14.8
New Orleans	1,600,679	3.9	2,193,121	2.8
Total	40,995,852	100.0	77,156,432	100.0

About 70 per cent. of the total receipts were corn during the last week, and New York gained largely in its position as a receiver of that grain, chiefly at the expense of Philadelphia. But New York does not quite hold its own in receipts of grain of all kinds, and Philadelphia also loses, while Baltimore gains. For the last week the percentage of receipts of corn at each leading port was: New York, 44 per cent.; Baltimore, 23; Philadelphia, 13.8; Boston, 9.5; Montreal, 8 per cent. In grain of all kinds these percentages were: New York, 41¼ per cent.; Baltimore, 20⅔; Philadelphia, 15; Montreal, 13¼; Boston, 8⅓.

The shipments from the Northwest for this week included a larger amount of wheat than usual, and heretofore most of the wheat has gone to New York. If this does, its position may be expected to improve within a week or two; if not, it will indicate that it is not the corn trade alone of New York that is seriously threatened by Baltimore and Philadelphia.

If we compare the report for the entire 20 weeks with that for shorter periods, it will be observed that while New York has not quite held its own in respect to the total grain receipts, it has gained largely in corn. For the ten weeks ending with July 1, for instance, it was credited with 24.8 per cent. of the total corn receipts; now it has 30.4 per cent., and for the last ten weeks the proportion coming to New York has been 37.2 per cent. But for the earlier ten weeks New York's proportion of the total grain receipts were 44.9 per cent., while for the latter ten weeks they have been but 42.7 per cent. Thus, while New York has gained greatly in corn, its losses in other grains more than balanced this gain.

General Convention of the German Railroad Union.

The general convention of the German Railroad Union (not the technical convention) was held in Munich last July. The report of the presiding officer shows that there were 104 different companies or managements members of the Union, 58 of them German, 36 Austro-Hungarian, and eight of other nations. These had 30,840 miles of railroad, of which 17,775 miles were in Prussia, 11,315 in Austro-Hungary, and 1,750 in other countries. The managements together had 331 votes in the Union, the number of each being nearly in proportion to mileage.

Among the committee reports presented was one with regard to the payment to be made when companies use cars arriving from their connections for their own business in contravention of the regulations of the Union. Heretofore the company so using cars has been required to pay the owner $3.65 per car per day, the payment being in the nature of a rental plus a fine, as the regulations provide for the necessary use of cars in through traffic. It had been proposed to reduce this to $1, but the committee recommended that the rate per car per day be made $1.46. It says that at a dollar a day there might be danger that when there is a great pressure of traffic the cars would be kept from their owner purposely; but that the rate recommended is so much higher than any charge by the car-loaning companies when cars are scarcest that it will be likely to prevent anything of the kind.

Another committee reported a list of prices to be allowed for minor repairs of cars when done by companies not owning them. This list was first submitted to and approved by the Technical Convention of the Union, and was adopted at this "general convention." Among the prices in this list are the following: Renewal of drawhook, $3.90; renewal of valve drawbar spring, $3.40; complete screw coupling without bolts, $8; coupling pin, 40 cents: wooden buffer beam, $7.75; repair of bent or broken brake lever, 97 cents; new brake shoe, $2.43. No less than 145 different repairs are named in the list, references being made to a drawing to make them plain.

At this convention announcement was made of the awarding of prizes. In June, 1873, prizes were offered for three objects: for inventions and improvements in the construction of railroads or in apparatus connected therewith; for inventions and improvements in equipment and in its use; and for inventions and improvements in the field of railroad management and railroad statistics, also for railroad literature of distinguished excellence. These were to be introduced or published within the three years ending July 15, 1875. There were to be different prizes, from $364.50 to $1,822.50 each, amounting altogether to $7,290. There were 21 entries, five for the first group, nine for the second and seven for the third. Again in February, 1874, two prizes of $729 and $364.50 were offered for a new process of copying way bills; and in April, 1875, two prizes of $2,187 and $729 were offered for the invention of a car coupling to be operated from the side of the car. For the first of these were five entries; for the second, 26.

The prizes awarded for construction were the second prize of $729 to Mr. Schaefer, Inspector of Operation on the Rhenish Railroad at Cologne, for the construction of a central freight house at the station Cologne-Gereon, and the third prize of half that amount to Mr. W. Clauss, Chief Engineer of the Brunswick Railroad, for a track indicator constructed by him which measures the speed and represents graphically the superelevation of the rails on curves. In railroad literature the first prize of $729 was awarded to Prof. Gustav Cohn, of Zurich, Switzerland, Professor of National Economy and Statistics at the Polytechnic School there, for his work in two volumes, "Investigations Concerning English Railroad Policy." For the car coupling, the first prize was awarded to Mr. Becker, of Vienna, Central Inspector of the Emperor Ferdinand Northern Railroad. The other prizes were not awarded, the entries for them being considered either as not answering the conditions or as of insufficient value.

The prize for a car-coupler had been offered before, but though a great many entries were made, none were thought to merit a prize. Car-coupling is even more dangerous in Germany than in this country, there being a buffer on each side, so that the man who goes between the cars to couple them is likely to be caught between them. The Committee felt confident that the apparatus to which they gave the prize was perfectly practicable and efficient.

Bad Management by the Pullman Car Company.

Doubtless many travelers will join us in a complaint at the manner in which the above company manages its cars in Philadelphia, and the treatment it dispenses to the public who patronize them. A few days ago the writer had occasion to come from Philadelphia to New York on the "Limited Express," which leaves Philadelphia at 1:35 p. m. No passenger is allowed to travel on this train without a regular passage ticket and also a ticket for a seat in a drawing-room car. The latter ticket reads as follows:

"Pennsylvania Railroad Company. Special Ticket for extra fare on New York Limited Express train. This special ticket for extra fare, when officially stamped and dated and presented in connection with a full first-class ticket, will entitle the holder to seat No. —— in Pullman Parlor Car No. ——, from West Philadelphia to New York, in the New York Limited Express train, leaving West Philadelphia at 1:35 p. m., Sept. 18, 1876.

"☞ This ticket will be forfeited unless used upon the day and train specified above. D. M. BOYD, JR.

"Issued by the Pennsylvania Railroad Company on account of Pullman Palace Car Company.

"Pullman Parlor Car seat check. West Philadelphia to Jersey City."

The blanks for the numbers of the seat and car were not filled up. When the train—which was a through train from Washington—arrived there was a great throng of people waiting for it, and as the seats were not designated there was a free scramble for seats. Enough passengers, including many ladies, to fill the rear car at once occupied it. They were hardly seated before one of the train attendants announced that the car would not go to New York, so all who were in it felt obliged to leave it and go into the other cars, the seats in which were then all occupied. After wandering around aimlessly for some time, without any one to direct them, it was announced by other train attendants that the rear car would go, so all hurried back again.

Now what we find fault with is this: The Pullman Car Company sells tickets which, it is understood, entitles the purchaser to a specified or secured seat in its cars, just as a ticket to a secured seat in a theatre does. At least this has been its practice heretofore, and is so understood by the majority of travelers. When, therefore, through carelessness or indifference it neglects to specify the number of the seat and car, it is not giving an equivalent for the money received as one of the main objects in traveling in parlor cars, and paying an extra price for the privilege, is that by doing so a seat is secured, and the crowding, scrambling and uncertainty of getting one are thus avoided.

A few months ago, in going from Philadelphia to Pittsburgh, a similar condition of things occurred on a train with three or four sleeping cars. The number of the berth was designated, but not the number of the cars. The result was that passengers went from one car to another, and in each were told that another car was the one they should take. The conductors and porters were in a state of bewilderment, and several apparently inexperienced travelers nearly distracted. From conversation with porters and passengers, it appeared that the two cases referred to were not at all exceptional but very common. On the last named occasion there was also no one to say which cars in the depot would go and which would not. Now certainly there can be no great difficulty in learning and announcing the latter information and, by aid of the telegraph, which seats or berths are sold, and thus not duplicating their sale. The present condition of things must be the result of the grossest neglect or indifference; and calls for the application of a very sharp stick somewhere in the Philadelphia office.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Hart's Location.—Completed from Lawrence Place, N. H., northward to Hart's Location, 2¼ miles.

Emlenton & Shippensville.—The first track is laid, from Emlenton, Pa., north by east 5 miles. It is of 3 ft. gauge.

Cincinnati Southern.—There are 35 miles of track reported in addition to that already noted as laid.

Wisconsin Central.—The *Portage Branch* is extended southward 19 miles to Packwaukee, Wis.

Texas Transportation.—This road is completed from Clinton, Tex., west to Houston, 7¼ miles.

North Pacific Coast.—Extended from Tomales, Cal., northward to Freestone, 10 miles. It is of 3 ft. gauge.

Central Pacific.—On the *Ione Branch* the first track is laid from Galt, Cal., east 10 miles.

This is a total of 89 miles of new railroad, making 1,556 miles completed in the United States in 1876, against 746 miles reported for the corresponding period in 1875; 1,025 in 1874, 2,507 in 1873 and 4,623 in 1872.

CAST-IRON CAR WHEELS are the subject of a controversy between two Swiss railroads. One company has recently begun to use them under its freight cars; the other refuses to permit cars with such wheels to pass over its line, condemning them as unsafe, to the great disadvantage of through traffic from the connecting road. An appeal was made to the Swiss Railroad Department, and that body has referred it to the council of the confederacy. In the arguments made so far we have seen no mention of the fact that cast-iron wheels are used almost exclusively, for passenger as well as freight trains, on 75,000 miles of American railroads, and that accidents from wheel breakage are decidedly rare. Is is very easy to make bad cast-iron wheels, however, and we shall not undertake to say that the prohibition is not right in this case.

The Southern Railway and Steamship Association.

Early in August last, Mr. Virgil Powers, General Commissioner of the Association, addressed a circular letter to members, calling attention to the fact that the settlement of the accounts of the old pool, from Jan. 1 to Nov. 15, 1875, was very improbable. He suggested that settlement of the balances, for both cotton and merchandise, which have accrued since Nov. 15, 1875, be accepted in full for both old and new accounts. As several companies indebted on the new accounts were creditors on the old, he proposed that the new indebtedness be considered as an offset to the old credits. To make payments easy he suggested that the amounts be divided into six equal payments and accepted drafts falling due the first of each month from Oct. 1, 1876, to March 1, 1877, be received in payment. He proposed that the funds so received be distributed *pro rata* among the creditor companies, and that in future all balances be paid monthly in cash.

A supplementary circular explaining the details of this arrangement and giving the amounts due from and to each company, showed that the total indebtedness on cotton from Jan. 1, 1875, to July 31, 1876, and on merchandise from Feb. 8, 1875, to Nov. 15, 1875, was $200,895.17½, in payment of which he recommended the creditor companies to accept $68,985.69½.

Pursuant to a call from the President, Hon. Joseph E. Brown, a special meeting of the association assembled at the Kimball House, Atlanta, Aug. 30. The following representatives were present:

Hon. John P. King, President, S. K. Johnson, Gen'l Sup't., George Hillyer, Director, for Georgia Railroad & Banking Company, and for Macon & Augusta Railroad Company.

E. W. Cole, President, John W. Thomas, Gen'l Sup't., for Nashville, Chattanooga & St. Louis Railway Company.

Wm. MacRae, Gen'l Sup't., for Western & Atlantic Railroad Company.

S. S. Solomons, Gen'l Sup't., for South Carolina Railroad Company.

B. D. Hassell, Gen'l Agent, J. M. Selkirk, Gen'l Agent West, for Great Southern Freight Line, via Charleston.

E. A. Flewellen, Managing Director, John A. Grant, Gen'l Sup't., for Macon & Brunswick Railroad Company.

R. G. Fleming, General Superintendent, T. S. Davant, General Freight Agent, for Port Royal Railroad Company.

William Rogers, General Superintendent, Dr. J. M. Bozeman, Director, W. J. Raoul, Superintendent Southwestern R. R., for Central Railroad and Banking Co., of Ga., Savannah. Griffin & N. Ala. R. R. Co. and N. Y. & Savannah Steamship Lines.

C. M. McGhee, Vice President, for East Tennessee, Virginia & Georgia Railroad Co. and Memphis & Charleston Railroad Company.

A. Pope, General Freight Agent for the Atlantic Coast Line of Railways.

John H. Fisher, Receiver, John B. Peck, General Superintendent for Atlanta & Richmond Air Line Railway.

W. L. Clark, Superintendent, for Mobile & Girard Railroad Company.

E. P. Alexander, General Manager, S. D. Hubbard, Jr., General Freight Agent, for Western Railroad of Alabama.

B. Dunham, General Superintendent, for Montgomery & Eufaula Railroad Co.

L. P. Grant, Superintendent, for Atlanta & West Point Railroad Co.

J. W. Sloss, President, for South & North Alabama Railroad Co.

T. M. R. Talcott, General Superintendent, Sol Haas, General Freight Agent, for Richmond & Danville Railroad Co.

G. Jordan, Engineer and General Superintendent, for Mobile & Montgomery Railroad Co.

Robert N. Gourdin, Chairman of Committee of Stockholders, Central Railroad and Banking Co. of Georgia.

Virgil Powers, General Commissioner.

The General Commissioner explained that the principal object of the meeting was to consider the propositions above referred to. A resolution was offered that it was the duty of the

Association to procure the settlement of the old balances and appointing a committee to investigate the circumstances under which they accumulated. This was passed, but afterwards reconsidered and a substitute adopted agreeing to the proposed settlement and pledging members of the Association to pay all future balances monthly, in cash.

The General Commissioner was authorized to remove his office from Atlanta to Macon, Ga.

A further resolution was afterwards adopted repeating the acceptance of the proposed settlement, and giving companies not having yet accepted it 20 days in which to do so. In case of their failing or declining to do so, the General Commissioner was directed to return to the companies having paid in the amount of their indebtedness the *pro rata* share of the amount remaining in his hands by reason of such refusal. The resolution also pledged companies to maintain the rates made by the General Commissioner.

The condition of rates to Chattanooga being referred to, Col. E. W. Cole promised to join with the Louisville & Nashville in a circular letter to the Northern trunk lines notifying them that the rates must be maintained, and that bills of lading issued at lower rates would not be protected.

A circular issued by the General Commissioner Sept. 5 recommends the appointment by the initial roads of a common agent at each of the division points (Augusta, Macon, Atlanta, Rome, Newnan, West Point, Montgomery and Selma), the appointment to be made at once and by mutual agreement, or in case companies could not agree, by the General Commissioner. The duties of this common agent would be to give all desired information, rates on cotton, etc., to the public, and sign all bills of lading by all routes, bringing about as far as possible the division of business agreed upon to each point of destination, reports to be made by him daily to this office, and to each initial road, of each bill of lading issued, giving number of bales, route, destination and rate, the latter to be in accordance with instructions from the Commissioner's office only.

The rates on cotton for the season, as fixed by the Association, and taking effect Sept. 11, are as follows:

Per Hundred Pounds. From	Savannah.	Charleston.	Port Royal.	Wilmington.	Norfolk or Portsmouth.	Baltimore.	Philadelphia.	New York.	Boston.	Providence.	Fall River.
	$	$	$	$	$	$	$	$	$	$	$
Augusta, per bale	1 25	1 25	1 25	1 50	2 50	3 25	3 50	3 50	4 25	4 25	4 25
Macon	40	40	40	50	55	85	90	90	1 00	1 00	1 00
Milledgeville	40	40	40	50	55	85	90	90	1 00	1 00	1 00
Athens	....	....	....	....	....	95	1 00	1 00	1 10	1 10	1 10
Atlanta	55	55	55	60	65	95	1 00	1 00	1 10	1 10	1 10
Rome	55	55	55	60	65	95	1 00	1 00	1 10	1 10	1 10
Dalton	55	55	55	60	65	95	1 00	1 00	1 10	1 10	1 10
Fairburn	70	70	70	75	80	1 10	1 15	1 15	1 25	1 25	1 25
Palmetto	70	70	70	75	80	1 10	1 15	1 15	1 25	1 25	1 25
Newnan	75	75	75	80	85	1 15	1 20	1 20	1 30	1 30	1 30
Graniteville	80	80	80	85	90	1 20	1 25	1 25	1 35	1 35	1 35
Hogansville	85	85	85	90	95	1 25	1 30	1 30	1 40	1 40	1 40
LaGrange	75	75	75	80	85	1 15	1 20	1 20	1 30	1 30	1 30
West Point	70	70	70	75	80	1 15	1 20	1 20	1 30	1 30	1 30
Opelika	65	65	65	70	75	1 15	1 20	1 20	1 30	1 30	1 30
Montgomery	55	55	55	65	70	85	90	90	1 00	1 00	1 00
Selma	55	55	55	65	70	85	90	90	1 00	1 00	1 00
Chattanooga	45	45	45	....	....	75	80	80	90	90	90

The annual convention of the Association will be held in Atlanta, Ga., Oct. 4. Among the matters to be acted on are a proposition "that an additional clause be added to Article 26 of agreement authorizing the General Commissioner, in case of failure of any company to pay drafts made on it for its proportion of expenses of Association, etc., to proceed legally against such defaulting company, and in meantime to check proratably upon other companies for amount needed." An additional article to agreement will also be proposed, "making initial or terminal railroads responsible for expenses and balances that may accrue against steamship and other connections.

"The foregoing additions to agreement, it will also be proposed, shall be incorporated in the rules and regulations, and sundry other changes and alterations of rules and regulations will be proposed, among which are the following: Rule 10 it will be proposed shall be amended, 'requiring members of the Association to give preference to connections which are also members, by giving to such connections at sub-division points the proportion of business alotted to their line at initial division points.'

"It will also be proposed to permanently fix the compensation for excess carried as *one cent per ton per mile*.

"The General Commissioner will make report upon the compromise proposed, in reference to accounts of old clearing house, as per circular letters Nos. 38 and 41."

Erecting Locomotive Guide Bars.

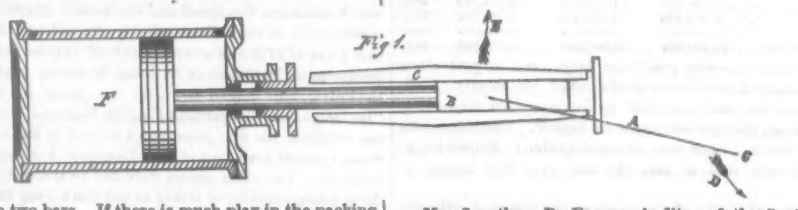
TO THE EDITOR OF THE RAILROAD GAZETTE:

It is a common practice, in erecting locomotive guide-bars, to leave the top bar or bars clear of the guide-blocks, and an inspection of the locomotives exhibited at the Centennial Exhibition discloses that while less clearance is, in this respect, allowed upon some than upon others, it exists in all, to a greater or less degree. The reason assigned for this practice is that it is intended to run the engine and then adjust the bars to the wearing marks. Thus the fitting of the engine is not finished when it is turned out, and it must therefore go back into either the shop or the round-house to be finished, nor is it possible by any such a method to set the bars true with the bore of the cylinder. That the bottom bar is not in such a case set true is acknowledged, otherwise the top one would merely require setting so that the guides would slide an easy-working fit from end to end, and the whole adjustment would be complete. As a matter of fact, these guide-bars so erected are useless as guides to the guide-blocks, except it be so that they prevent the bending of the piston-rod, that is to say in other words, that the guide-bars are either inoperative as guides to the cross-head and guide-blocks, or else they act to force them to travel in a line not parallel to the counterline of the bore of the cylinder and thus entirely pervert their proper function.

The idea of adjusting the guide bars from the wearing marks made upon them by running the engine is absurd, because the conditions are such as to preclude the possibility of the marks forming any guide whatever, as will be clearly seen by referring to the illustration, Fig. 1, in which *A* represents the center-line of the connecting rod, *B* the guide block, *c* the top guide bar, and *D* the direction in which the wheels revolve when the link is in the forward gear. Now the steam being on the *F* side of the piston and the point of resistance being at *G*, the resultant strain on the cross-head journal is in the direction of the arrow *E*, and if there is any space between the guide block and the top bar, the former will spring until it meets the latter, no matter how much it springs or bends the piston rod; and if the packing ring and gland are a close fit, an enormous friction will be created between the bottom of the piston and the cylinder bore. There is usually however sufficient play to avoid this latter result when the piston and cross-head are in the positions shown, when, however, the cross-head is near the end of the stroke at the cylinder-cover end of the guide bar there will be a great resistance to the spring of the piston rod, and if the top bar is not in contact with the guide-block there will be created a great deal of friction between the piston and the bore of the cylinder before the guide-block is sprung to meet the top bar. It will be observed that when the engine is in the forward gear, the strain and friction are at each stroke upon the top bars, while in the backward gear it is upon the bottom bars, and the cross-head will in either case spring till it meets the bar, especially when the piston-rod is more than half out of the cylinder. Under these circumstances it is impossible to set the guide bars from the friction marks due to running the engine, nor is there any temptation to do so, since it is perfectly practicable to set them properly when erecting them, which may be done as follows:

The piston being placed in position in the cylinder, with the packing ring and gland in their places and the cross-head keyed to the piston-rod, the bottom bars may be put into their places and drawn up with the bolts until they touch the guide-blocks and, tested by a spirit level, stand level with the bore of the cylinder, and horizontally level one with the other. This adjustment being made, liners of the necessary thickness, or rather a shade too thick, may be made and placed in position, the guide-bars then being bolted firmly home. The next operation is to place across the face of the bars and at each end a barely perceptible coating of red marking, and then to push the cross-head back and forth the full length of the stroke, when the marks will show clearly where the guide-blocks bear and where they do not; the liners may then be filed to bring the bars to bear evenly against the guides; the spirit level being frequently applied lengthwise of each and crosswise at each end of the two bars. If there is much play in the packing ring and gland, the first setting of the bars should be done while the guides are near the cylinder-cover end of the stroke, which will save much filing during the adjustment of the liners. When the bottom bars are set the top ones may be adjusted by the liners until they show by a barely perceptible coating of marking that the guide-blocks bear all over them, while the fit is sufficiently free to enable the workman to be able to push and pull the cross-head and piston rod back and forth by the hand.

Fig. 1.



General Railroad News.

ELECTIONS AND APPOINTMENTS.

New York & Long Island Bridge.—At the annual meeting in New York, Sept. 13, the following directors were chosen: Wm. Steinway, Herman C. Poppenhusen, O. Zollicoffer, John T. Conover, R. M. C. Graham, Pliny Freeman, Charles A. Trowbridge, Oswald Ottendorfer, Edward J. Woolsey, Gottlieb Gunther, Herman Funcke, Edward Einstein, Abraham D. Ditmars, Willy Wallach, C. Godfrey Gunther, Charles F. Tretbar, Charles H. Rogers, John C. Jackson, Thomas Rainey, Archibald M. Bliss, Herman T. Livingston.

West Wisconsin.—At the annual meeting in Hudson, Wis., Sept. 6, the following directors were chosen: H. H. Porter, J. H. Howe, P. Sawyer, W. H. Ferry, David Dows, R. P. Flower, H. Thompson, N. W. Kittson, J. Comstock, M. Hughitt, J. C. Spooner, E. W. Winter, George Catlin, Henry Seibert, T. Dreire. The directors elected the following officers: President, H. H. Porter; Vice-President, J. H. Howe; Treasurer, R. P. Flower; Secretary, H. H. Weakley. Five of the directors are also directors of the Chicago & Northwestern.

Indianapolis, Bloomington & Western.—At the annual meeting in Urbana, Ill., Sept. 13, the following directors were chosen: D. T. Thompson, H. Conkling, W. Y. McCord, L. J. Bond, W. H. Smith, J. C. Shortt, C. W. Smith, George Nebeker, B. E. Smith, F. Collins, J. T. Thomas, R. Turner, C. R. Griggs. The board elected B. E. Smith President; C. R. Griggs, Vice-President; A. P. Lewis, Secretary and Treasurer.

Southern Central.—At the annual meeting in Auburn, N. Y., Sept. 5, the following directors were chosen: Elmore P. Ross, Thomas C. Platt, William C. Barber, Chauncey L. Rich, Clinton T. Backus, Charles Cady, Robert A. Packer, John N. Knapp, Royal W. Clinton, Charles N. Ross, Dexter H. Marsh, James A. Timpson, James G. Knapp. The board elected E. P. Ross President; T. C. Platt, Vice-President; J. N. Knapp, Secretary; C. L. Rich, Treasurer.

Kansas Pacific.—Mr. D. E. Cornell has been appointed Assistant General Passenger and Ticket Agent. He has been for several years Chief Clerk in the General Ticket Agent's office.

St. Louis, Kansas City & Northern.—The board of directors has chosen Mr. Walter Katte Treasurer, in place of Charles Taussig, Sr., deceased. Mr. Katte was for many years engineer of the Keystone Bridge Company at Chicago and St. Louis, and recently has been city engineer of the St. Louis.

Indianapolis, Peru & Chicago.—At the annual meeting in Indianapolis, Sept. 12, the following directors were chosen: William Henderson, T. P. Haughey, William Cutting, David Macy, V. T. Malott. The board elected David Macy President; V. T. Malott, General Manager; L. G. Cannon, Secretary and Treasurer.

Brotherhood of Locomotive Firemen.—At the annual convention in St. Louis, Sept. 12, the following officers were chosen: Grand Master, W. R. Worth, Brookfield, Mo.; Vice Grand Master, John Broderick, Hornellsville, N. Y.; Grand Secretary and Treasurer, Wm. N. Sayre, Indianapolis.

Nashville, Chattanooga & St. Louis.—At the annual meeting in Nashville, Tenn., Sept. 14, the old board of directors was re-elected, as follows: E. W. Cole, John M. Bass, T. D. Fite, J. A. Satterwhite, N. C. Collier, H. C. Shapard, B. F. Wilson, G. M. Fogg, Nashville, Tenn.; E. L. Jordan, J. W. Childress, Murfreesboro, Tenn.; Thomas C. Whiteside, Thomas Lipscomb, Shelbyville, Tenn.; W. S. Huggins, Manchester, Tenn.; A. Iselin, Vernon K. Stevenson, New York. The board re-elected the old officers, as follows: President, E. W. Cole; Secretary and Treasurer, R. C. Bransford; General Superintendent, J. W. Thomas; Resident Engineer, R. C. Morris; General Bookkeeper, T. D. Flippen. There were 46,202 shares voted on, and the directors chosen received a unanimous vote.

Weston & West Fork.—Mr. Henry Brannon is President and George Barrett Chief Engineer of this company. Their offices are at Weston, Lewis County, West Va.

Sheboygan & Fond du Lac.—Mr. George P. Lee has been appointed Acting Superintendent.

North Louisiana.—The incorporators of this new company met in Shreveport, La., Sept. 14, and organized by electing the following officers: President, George L. Smith; Vice-President, Joseph Boisseau; Secretary, W. P. Ford; Treasurer, F. A. Leonard; Attorney, A. H. Leonard.

Keokuk & Northwestern.—The first board of directors of this new company is as follows: L. M. Shelley, C. P. Birge, R. H. Gilmore, A. L. Constable, S. S. Sample, D. G. Lowry, Smith Hamill, Edmund Jaeger, J. K. Hornish. The office is in Keokuk, Ia.

PERSONAL.

—Mr. John T. Shelton, for several years Treasurer of the New York, New Haven & Hartford Railroad Company, died at his residence in Bridgeport, Conn., Sept. 16, after a brief illness, at the age of 41 years.

—Gen. George Maney, President of the Tennessee & Pacific Railroad Company, is running as an independent candidate for Governor of Tennessee.

—The statement that Mr. H. N. Johnson had resigned his position as Superintendent of the Ohio & Toledo road is contradicted. Mr. Johnson has a leave of absence to attend to some private business, but has not resigned.

—Gen. M. Jeff. Thompson, who died in St. Joseph, Mo., Sept. 5, and who was known chiefly as a General in the Confederate army during the late war, was also a civil engineer of some repute. He was employed on the Hannibal & St. Joseph road from 1850 to 1855, while it was being built, and was afterwards City Engineer of St. Joseph. He located a part of the St. Joseph & Denver City road, and built the first 14 miles almost at his own expense. He was, for several years after the war, State Engineer of Louisiana.

—Mr. Jonathan R Emery, Auditor of the South Carolina Railroad, died recently at his residence in Summerville, S. C. He was 53 years old and had been in the service of the company 25 years.

—Mr. Elisha B. Payne, Master Car Builder in charge of the Boston & Albany shops at East Albany, N. Y., having resigned recently, the men employed in the shops presented him with a handsome gold watch. Mr. Payne intends to engage in other business.

—Sir Edward Watkin, who came to this country to report on the Erie Railway for the English proprietors, is said to receive £2,000 a year as Chairman of the Sheffield Railway, and £2,500 each as Chairman of the Southeastern and the Metropolitan, £7,000 in all. It is further reported that he received £7,000 for his services in connection with the Erie. Sir Edward also finds time to serve as a member of Parliament.

TRAFFIC AND EARNINGS.

Grain Movement.

San Francisco wheat shipments for August were 28 cargoes, all to Great Britain, consisting of 1,583,185 bushels. The flour shipments were 24,111 barrels, of which 15,737 went to China and Japan, 5,290 to Central America and Panama, and the rest to the Pacific islands. For the two months of the California crop year ending Aug. 31, the shipments were as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Wheat, bushels	2,659,518	1,968,392	Inc.. 691,126	35.1
Flour, barrels	87,711	81,000	Dec.. 23,289	28.8
Total, bushels	2,919,218	2,332,892	Inc.. 586,326	25.1

During the same two months the wheat receipts at all the Atlantic ports were 14,000,000 bushels this year and 21,500,000 last.

Last year in August there were large shipments of flour from San Francisco to England, while none were made this year.

Iron Ore Movement.

Shipments of iron ore from the Lake Superior Region from the opening of navigation up to Aug. 30 were as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Marquette, tons	308,664	320,982	Dec.. 12,318	3.8
Escanaba	224,979	160,878	Inc.. 74,151	46.1
L'Anse	84,136	46,737	Inc.. 7,399	15.8
Totals	597,779	528,547	Inc.. 69,232	13.1

There has been a gradual increase through the season, which was fairly maintained in August.

Grain Movement.

Receipts and shipments for the week ending Sept. 9 are reported as follows, in bushels:

	1876.	1875.	Increase.	P. c.
Lake ports' receipts	4,240,764	3,747,319	493,445	13.2
Lake ports' shipments	4,192,884	3,829,607	363,277	9.5
Atlantic ports' receipts	3,512,306	3,318,691	293,615	8.9

Of the shipments from lake ports, 43¼ per cent. were by rail this year against 39⅛ in 1875 and 9⅛ in 1874. The total shipments are the largest since harvest, and in them for the first time wheat enters for a large proportion.

Chicago receipts and shipments for the week ending Sept. 16 were:

	1876.	1875.	Inc. or Dec.	P. c.
Receipts	1,548,637	1,707,649	Dec.. 159,012	9.3
Shipments	2,435,998	1,923,791	Inc.. 512,207	26.6

The receipts are the smallest and the shipments the largest for many weeks.

Coal Movement.

Coal tonnages for the week ending Sept. 9 are reported as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Anthracite	415,871	557,994	Dec.. 141,723	25.4
Semi-bituminous, Broad Top	3,014	.....	.....	....
" " Clearfield	23,752	17,156	Inc.. 6,596	38.3
" " Cumberland	44,267	50,530	Dec.. 6,263	12.4
Bituminous, Barclay	7,634	8,960	Dec.. 1,326	13.4
" Allegheny Region	2,069	49,967	Dec.. 25,090	50.2
" Pittsburgh Region	15,845			

The Pennsylvania Coal Company announces that it will sell

100,000 tons of coal at auction, in New York, Sept. 20. The Delaware, Lackawanna & Western Company also gives notice of a sale of 100,000 tons at auction, to take place Sept. 27. It is understood that both companies will continue to hold monthly sales.

The coal tonnage of the Columbus & Hocking Valley road for August was 57,706 tons.

The prices obtained at the Pennsylvania Coal Company's auction sale, Sept. 20, were as follows:

55,000 tons grate, steamboat and lump; per ton...	$2.90	to	$3.09¼
6,000 " egg.....	3.12½	"	.....
25,000 " stove.....	3.60	"	3.75
10,000 " chestnut.....	3.17½	"	3.80

As compared with the prices realized at the great sale last month there is but little change on stove and nut sizes, but a gain of from 20 to 40 cents per ton on the larger sizes. Many buyers were present and the bidding was spirited.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending June 30:

	1875-76.	1874-75.	Inc. or Dec.		P. c.
Louisville & Nashville (including So. & No. Alabama)...	$4,961,490	$4,863,873	Inc..	$97,616	2.0
Expenses.....	2,993,530	3,181,741	Dec..	188,211	5.9
Net earnings.....	$1,967,960	$1,682,133	Inc..	$285,827	17.0
Earnings per mile.	5,387	5,281	Inc..	106	2.0
Per cent. of exps...	60.34	65.42	Dec..	5.08	7.8
Memphis & Charleston.....	1,033,367	1,063,327	Dec..	29,960	2.8
Expenses.....	712,136	879,833	Dec..	167,697	19.1
Net earnings.....	$321,231	$183,494	Inc..	$137,737	75.0
Earnings per mile.	3,563	3,667	Dec..	104	2.8
Per cent. of exps .	68.91	82.74	Dec..	13.83	16.7

Eight months ending Aug. 31:

	1876.	1875.			
Atchison, Topeka & Santa Fe..	$1,476,205	$840,950	Inc..	$635,255	75.5
Cairo & St. Louis....	$172,745	$166,803	Inc..	$5,942	3.6
Central Pacific.....	11,257,166	10,999,422	Inc..	257,744	2.3
Canada Southern....	1,084,762	726,883	Inc..	357,879	49.2
Chicago & Alton....	3,140,643	2,912,371	Inc..	227,272	8.1
Chicago, Milwaukee & St. Paul.....	5,215,277	4,865,352	Inc..	349,925	7.2
Denver & Rio Gra'de.	261,208	235,734	Inc..	25,471	10.8
Illinois Central	4,625,704	4,815,421	Dec..	189,717	3.9
Indianapolis, Bloom. & Western.....	996,313	792,040	Inc..	204,273	25.8
International & Gr't Northern	724,378	741,528	Dec..	17,250	2.3
Missouri, Kansas & Texas.....	1,936,506	1,711,682	Inc..	224,824	13 1
Michigan Central...	4,438,883	4,196,197	Inc..	242,686	5.8
Ohio & Mississippi..	2,388,313	2,085,991	Inc..	302,322	14.5
St. Louis, Alton & Terre Ha'te—Belleville Line....	298,723	354,283	Dec..	55,560	15.7
St. Louis, Iron Mountain & Southern..	2,265,273	2,153,147	Inc..	113,126	5.2
St. Louis, Kan. City & Northern.....	1,972,890	1,637,675	Inc..	335,215	2.8
St. Louis & Southeastern	701,924	620,023	Inc..	81,901	13.2
Toledo, Peoria & Warsaw	929,502	631,745	Inc..	297,757	47.1

Seven months ending July 31:

Burlington & Missouri River in Nebraska.....	$391,525	$293,125	Inc..	$98,400	33.1

Month of July:

Burlington & Missouri River in Nebraska	$49,868	$41,364	Inc..	$8,504	20.5

Month of August:

Atchison, Topeka & Santa Fe.....	$231,549	$151,823	Inc..	$79,726	52.5
Baltimore & Ohio...	1,259,143	1,216,122	Inc..	43,021	3.5
Cairo & St. Louis....	26,082	23,874	Inc..	2,208	9.2
Central Pacific.....	1,689,000	1,553 014	Inc..	135,986	8.8
Canada Southern....	148,968	104,037	Inc..	44,931	43.2
Chicago & Alton	494,272	411,960	Inc..	82,312	20.0
Chicago, Milwaukee & St. Paul.....	559,492	630,516	Dec..	61,024	9.7
Cincinnati, Lafayette & Chicago	33,908	32,743	Inc..	1,165	3.6
Columbus & Hocking Valley.....	67,977	70,109	Dec..	2,032	2.9
Denver & Rio Grande, Main Line	34,477	32,761	Inc..	1,716	5.2
Denver & Rio Grande, Trinidad Exten....	9,972	.....	.....	....	....
Illinois Central.....	595,100	613,446	Dec..	18,346	3.0
Ind., Bloomington & Western	138,275	107,108	Inc..	31,167	29.1
International & Gr't Northern	85,384	79,467	Inc..	5,917	7.4
Missouri, Kansas & Texas.....	294,360	270,932	Inc..	23,428	8.6
Michigan Central...	542,772	527,744	Inc..	15,028	2.8
Ohio & Mississippi..	291,898	257,771	Inc..	35,127	13.6
St. Louis, Alton & Terre Ha'te—Belleville Line.....	35,113	40,444	Dec..	5,331	13.2
St. Louis, Iron Mt. & Southern.....	288,300	283,957	Inc..	4,343	1.5
St. Louis, Kansas City & Northern	255,688	248,836	Inc..	6,852	2.8
St. Louis & Southeastern.....	104,845	73,613	Inc..	31,232	42.4
Toledo, Peoria & Warsaw.....	143,471	113,013	Inc..	30,458	27.0

First Week in September:

Atchison, Topeka & Santa Fe.....	$50,209	$33,779	Inc..	$16,430	48.6
Missouri, Kansas & Texas	67,103	69,257	Dec..	2,154	3.1
Ohio & Mississippi..	83,202	91,666	Dec..	8,463	9.2

Second week in September:

Chi., Milwaukee & St. Paul.....	$150,000	$162,153	Dec..	$12,153	7.5
Michigan Central....	139,094	133,276	Inc..	5,758	4.3

Week ending Aug. 25:

Great Western, of Canada.....	£14,795	£15,207	Dec..	£412	2.7

Week ending Aug. 26:

Grand Trunk.....	£35,200	£36,300	Dec..	£1,100	3.0

Week ending Sept. 1:

Great Western, of Canada	£15,854	£17,154	Dec..	£1,270	7.4

Week ending Sept. 2:

Grand Trunk.....	£37,400	£36,300	Inc..	£1,100	3.0

THE SCRAP HEAP.

Railroad Manufactures.

The Edgar Thomson Steel Works have made a reduction in wages varying from 10 to 15 per cent.

The Girard Rolling Mill Company, at Girard, O., has made an assignment to Wm. M. Osborn, of Youngstown, O.

The Akron (O.) Iron Company's rolling mill is in full operation.

The steel works of the Joliet (Ill.) Iron & Steel Company are running full time.

The Grant Locomotive Works, at Paterson, N. J., have recently discharged 200 men and have very few now employed.

The Ontario Car Works, at London, Ont., have a contract for passenger cars for the Quebec, Montreal, Ottawa & Occidental Railway.

The Ohio Falls Car Company, having bought, as heretofore noted, the entire works of the Ohio Falls Car & Locomotive Company, at Jeffersonville, Ind., is now prepared to furnish cars of all kinds, car wheels, castings and forgings.

Mr. George Douglas, manufacturer of locomotive and car springs and forgings at Bridgeport, Conn., has orders on hand for 20,000 oil well rods, besides a large number of springs, is running 12 hours per day, and expects to continue doing so all winter. He has lately completed a new shop and expects to put up in it a 600-pound drop hammer, thereby increasing the capacity of his works.

The Pennsylvania Steel Company, at Baldwin, Pa., has a contract for steel rails for the Western Maryland road.

The Jersey City (N. J.) Car Wheel Works have a contract, running for a year, to supply car wheels to the Grand Trunk Railway Company.

A new company known as the Sanderson Brothers' Steel Company has been organized for the manufacture of cast steel at the mill lately owned by the Sweet's Manufacturing Company, of Syracuse, N. Y., and known as their Geddes Mill. This mill, which is located at Geddes, near Syracuse, and has been purchased by the new company, has four engines, one train of rolls, three gas furnaces, two converting ovens, a steel melting furnace and other necessary machinery. The new company has a capital of $450,000, and intends to manufacture steel of the brand known as "Sanderson's Best Cast Steel," from the same materials and by the same process as is used at the Sanderson Brothers' Works in Sheffield, England. The officers of the new company are: Robert B. Campbell, President; S. W. Johnson, Secretary; Edward Frith, Treasurer; Wm. A. Sweet, General Manager.

The Sweet's Manufacturing Company, at Syracuse, N. Y., manufactures steel springs, tires, crowbars and other tools.

The Central Car & Manufacturing Company, of Jackson, Mich., has a contract for 200 box cars for the Chicago, Pekin & Southwestern road.

The car wheel foundry of J. H. Bass, at Fort Wayne, Ind., has a contract for 1,600 wheels for the Chicago, Pekin & Southwestern road.

The Michigan City (Ind.) Car Works are building 100 box cars for the Chicago, Milwaukee & St. Paul road.

Wells, French & Co., of Chicago, are building 100 box cars for the Kansas City, St. Joseph & Council Bluffs road. They have also a contract for five Howe truss bridges and several pile bridges and trestles on the Burlington & Southwestern road.

The Pittsburgh Locomotive Works have contracts for four engines for the Chicago, Clinton & Western, and one narrow-gauge engine for the Chicago, Millington & Western.

OLD AND NEW ROADS.

Southern Pacific.

The distances given in our report of the completion of the line to Los Angeles last week were not correct, owing to an under-statement of the distance from Caliente to San Fernando. The distances, starting from San Francisco, are as follows: to Goshen, 228 miles; Mohave, 369.5 miles; San Fernando Tunnel, 443.7; San Fernando, 448.9; Los Angeles, 470; Colton, 527.5; Indian Wells, 599.5. From San Francisco to Goshen the track belongs to the Central Pacific; from Goshen to Indian Wells, 371.5 miles, to the Southern Pacific. Indian Wells is the point to which trains now run, but the track is being laid beyond toward Fort Yuma.

A committee has been appointed by the citizens of San Bernardino to confer with the officers of the company with respect to the construction of a branch to that town from Colton, about three miles.

Galveston, Harrisburg & San Antonio.

A large increase was made recently in freight rates over this road, including through rates. There is trouble in consequence, and some San Antonio merchants are hauling goods by team from Austin and directing all shipments to be made by that route, although the terminus of this road is now only 30 miles from San Antonio, and Austin is about 75 miles. The present through rate from St. Louis to Kingsbury on San Antonio freight is $200 per car.

Texas Transportation Company.

Track is now laid on this company's line from Clinton, Tex., west to Houston, 7¾ miles. The track is yet to be surfaced and ballasted and several connections made in Houston. Clinton is the head of the new ship channel which has been dredged out in Buffalo Bayou, and the new road is intended to connect the landing place of the Morgan steamship lines there with the roads entering Houston.

Central Pacific.

Track on the Ione Branch is now laid for 10 miles eastward from the junction with the main line at Galt, Cal. The grading of the remaining 18 miles is done, the track is going down rapidly and the branch is to be finished in October.

On the loop line from Oakland to Santa work proceeds steadily and the grade has reached the San Pablo Ranch.

The main line and branches in California are now fully employed in carrying the wheat crop to tide-water. The press of wheat is so great that cars and storage facilities are provided with difficulty and every available car is kept in constant motion.

The Missouri River Pool.

The report that at the meeting in St. Louis last week a pooling arrangement had been concluded on freights to and from Missouri River points is confirmed. The St. Louis *Republican* says of the meeting:

"The result of the meeting, as obtained from the Secretary, is that they have pooled the business in order that they may be sure of the rates being maintained. The pools are adjusted in such a manner as to make it an object to maintain rates. Any line cutting a rate in order to control a larger amount of business must pay into the pool a tariff on whatever they haul regardless of what they may have received for the freights carried. St. Louis merchants shipping goods to Missouri River points do not pay Missouri lines any more than is charged for the same quantity and class of articles by through lines on the same freights; in other words, any rate made from New York to Missouri River points must pay to the Chicago or St. Louis lines the same that is charged on business originating at St. Louis or Chicago, placing St. Louis and Chicago merchants on a perfect equality with New York merchants. To ascertain the rate from New York to Kansas City there must be added the rate from New York to St. Louis to the local rate from St. Louis to Kansas City.

"The same rule applies on all east-bound business. The rate from Kansas City to Baltimore on corn is made by adding the rate from Kansas City to St. Louis to the rate from St. Louis to Baltimore.

"The association adjourned to meet next month at Chicago."

The roads represented were the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy, the Chicago & Alton, the Hannibal & St. Joseph, the Missouri Pacific, the Atlantic & Pacific, the St. Louis, Kansas City & Northern, the Missouri, Kansas & Texas and the Kansas City, St. Joseph & Council Bluffs, and it is stated the Chicago & Northwestern also agrees to enter the pool.

Hart's Location.

This road is now nearly completed, the track being laid, and will be open for business in a short time. It extends from Lawrence Place, N. H., near Upper Bartlett, on the Portland & Ogdensburg road, northward 2¼ miles to Hart's Location. It is intended to transport lumber from the tract owned by the Upper Bartlett Land & Lumber Company. It has been built by C. W. Saunders & Co., of Lawrence, Mass., and has cost a little over $10,000.

Cincinnati & Portsmouth.

The contract for the construction of the entire line of this road from Cincinnati east by south to Portsmouth, O., has been let to John W. Rutherford & Co., of Columbus, O. There were 59 bids received for the work. The road is to be finished ready for trains by May 1, 1877, and the contract price is about $8,000 per mile. The line is a pretty direct one and is about 100 miles long. The road is to be of 3 ft. gauge and has some heavy grades, one as high as 142 feet to the mile. The contractors will begin work at once.

Railroad Mail Service Compensation.

The commission to consider the question of compensation for railroad mail service closed its session in New York Sept. 16. Postmaster James, of New York, spoke in favor of the fast mail system, and explained its workings with relation to the New York office. The views of several newspaper representatives on the same question were presented. Receiver Jewett, of the Erie Railway, spoke of the basis of pay for mail service, considering the question as to whether weight of mails, car capacity or speed of trains should be adopted as such basis. There were objections to each, but he considered payment by weight the fairest and most satisfactory.

The members of the commission left New York for Cleveland Sept. 18. After a session in that city they will go to Chicago.

Louisville & Nashville.

The following statement of earnings for four years past, the fiscal year ending June 30, is published, the earnings of the South & North Alabama being included:

	1875-76.	1874-75.	1873-74.	1872-73.
Gross earnings.	$4,961,490 29	$4,863,873 80	$5,510,695 46	$6,106,051 84
Working exp's.	2,993,530 24	3,181,740 96	3,945,313 11	4,622,004 47
Net earnings...	$1,967,960 05	$1,682,132 84	$1,565,382 35	$1,484,047 37
Per cent. of expenses.....	60.34	65.42	71.59	75.69

The statement shows a steady decrease in gross earnings, with a still greater decrease in expenses and an increase of net earnings. The volume of traffic has increased, but there has been a great falling off in rates, in the face of which the expenses have been reduced.

The months of July and August, the two first of the current fiscal year, have shown a very considerable increase both in gross and net earnings. The President anticipates that, unless some unforeseen contigency prevents, dividends upon the stock can be resumed in 1877.

Connecticut Valley.

The Boston *Advertiser* of Sept. 19 says: "The Connecticut Central and Connecticut Valley roads have come to an agreement by which the line will be reopened this week. The terms of settlement are about the same as had once before been agreed upon—the Valley trustees to sublease the Longmeadow road, for which they pay $7,000, to the Connecticut Central for $6,000, and the line from Springfield to Saybrook to be run by the Connecticut Valley and Connecticut Central in common under certain conditions, the earnings to be divided *pro rata*. The new lease must be ratified by the stockholders of the Longmeadow road."

The stock of the Springfield & New London (locally known as the Longmeadow road) is nearly all owned by the city of Springfield, whose authorities have hitherto strongly objected to any lease to the Connecticut Central, but may give way to secure the reopening of the line.

Chicago, Burlington & Quincy.

We copied in our last issue (page 410) a report that this company has bought the road-bed from Ottumwa to Sigourney, connecting with the Chicago, Clinton & Southwestern, which would make an additional route from Ottumwa to Chicago. We are officially informed that this rumor is without any foundation in fact; the Chicago, Burlington & Quincy Company has not bought the road-bed, and has no intention of developing another route from Southern Iowa to Chicago, by way of Clinton. The credit of this company is such that unscrupulous men sometimes take pains to intimate that it supports projects in which they are interested, but with which the company has nothing to do.

Chicago & Southwestern.

A dispatch from Jefferson City, Mo., to the St. Louis *Republican* says: "At a meeting of the stockholders of the Chicago & Southwestern Railway Company of Missouri, held on the 12th inst. in New York city, the sale of said road to the Iowa Southern & Missouri Northern Railroad Company was agreed to, and the consent of the stockholders and certificate of the President and Secretary of the first-named road as to the agent have been filed in the office of the Secretary of State. The sale was made for the following reasons:. In October, 1869, the Chicago & Southwestern Railway Company issued a series of bonds amounting to $5,000,000, the payment of which and interest was guaranteed by the Chicago, Rock Island & Pacific Railroad Company, and secured by a first mortgage or deed of trust conveying certain property to David Dows, Fred. S. Winston and Calvin F. Burnes, the terms of which provided that the guarantor should be subrogated to all the rights of the holders of the coupons and bonds which it should be compelled to pay in performance of the contract of guaranty.

"Prior to the 3d of August the guarantor advanced money in payment of matured coupons to the amount of $1,369,361, and the trustees in the mortgage obtained in the Circuit Court of the United States, district of Iowa, a final decree against the Chicago & Southwestern Railway Company for $1,571,628, as a first lien on said road (subject to rights of holders of outstanding bonds and coupons of said series under the mortgage), and also the further sum of $1,340,228 expended by the Chicago, Rock Island & Pacific in the operation of the line over and above amount received for transportation, etc., the latter being a junior lien. This judgment and the further sum of $171,828 due for money advanced since the decree, and prior to July 1, 1876, having become the property of the Iowa Southern & Missouri Northern Railroad Company, this company consents to buy the Chicago & Southwestern, and extinguish the liability of the same under the decree and releases said road from any further liability thereunder.

"The conveyance is not to act as a merger of any rights secured to any parties by the mortgage or under the decree, except the right to enforce payment of the sum mentioned; and after the acceptance of the sale the Iowa Southern & Missouri Northern Railroad may purchase the property at the judicial sale under the decree, and the conveyance of the same there made shall operate to vest said company with all the rights, title and interest which could be asserted thereunder if this sale had never been made, and it may demand the foreclosure of the mortgage as to all bonds and coupons not embraced in said decree, and which are now or may hereafter become its property.

"This property to be conveyed is the main line of the Chica-

go & Southwestern Railway, extending from a point on the Washington Branch of the Chicago, Rock Island & Pacific Railroad at Washington, Ia., and running through said State to the Missouri line; and thence through the counties of Mercer, Grundy, Davies, DeKalb, Clinton and Platte, in this State, to the Missouri River, near Leavenworth in Kansas, with all the property, franchises, etc., of every nature thereto belonging. This conveyance does not embrace the Atchison Branch of the Chicago & Southwestern Railway, or its rights, privileges, etc., said branch being excepted by the terms of the sale."

Rock River Valley.

At a meeting of the directors, held in Dixon, Ill., Sept. 4, it was resolved to go on with the work on this road as fast as possible. The line is from Sterling, Ill., east by north to Dixon and thence northeast to Rockford; it is about 36 miles long, and is intended to connect the St. Louis, Rock Island & Chicago with the Chicago & Pacific, securing to the former road an outlet to Chicago. About $100,000 have been subscribed along the line. The company promises to issue the stock with 10 per cent. annual coupons attached, which coupons when due are to be receivable in payment of passenger fares and freight bills. The company offers to extend the line from Byron to Rockford, 14 miles, provided the Rockford people will subscribe $50,000 to the stock and secure the right of way. It is said that contracts are to be let at once with the intention of having the road completed by Dec. 1. The line heretofore surveyed was on the west side of Rock River, but another line is being run on the east side of the river, it being thought that a better line could be found there which would also avoid the expense of a bridge required at Grand Detour, on the first line.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Northern Pacific, at the office, No. 23 Fifth avenue, New York, Sept. 27, at 11 a. m. Transfer books are closed from Sept. 20 to Sept. 30.

Cayuga, at the office of the company, No. 76 Wall street, New York, Oct. 10, at noon.

Western Union, at the office in Milwaukee, Wis., Oct. 11, at noon.

Ohio & Mississippi, at the office, No. 217 West Fourth street, Cincinnatti, Oct. 12, at 10 a. m. Transfer books are closed from Sept. 20 to Oct. 16. Bondholders as well as stockholders have votes.

Memphis & Charleston, in Memphis, Tenn., Oct. 12.

Western Union Telegraph, at the office in New York, Oct. 11. Transfer books are closed from Sept. 20 to Oct. 17.

St. Louis, Bloomfield & Louisville.

The track of this road has been put in good order and trains began to run regularly over the whole length of the road between Switz City, Ind., and Bedford, 35 miles, Sept. 13.

Chicago & Lake Huron.

The Receiver reports for August receipts amounting to $23,120.51, and disbursements of $22,334.20, leaving a balance for the month of $786.31.

Dividends.

Dividends have been declared by the following companies:

Chicago, Rock Island & Pacific, 4 per cent. semi-annual, payable Oct. 27.

Western Union Telegraph, 1¾ per cent., quarterly, payable Oct. 16.

Dubuque & Sioux City (leased to Illinois Central), 2 per cent., payable Oct. 16.

Cincinnati Southern.

Of the 258 miles of this road from Cincinnati southward to Emory Junction, Tenn., the road-bed is completed for 221 miles and track is laid on 95 miles.

Erie.

New York papers give the following as the susbtance of Mr. Jewett's statements of the results of his visit to England: He had conference, public and private, with parties representing, as he believed, a great majority of the bonds, who accepted the proposition of reorganization, with but few exceptions, and agreed to the funding of the coupons as named in the public scheme, and to permit the money to be applied to the improvement of the road, which is equivalent to a loan of that amount. They agreed that all stockholders may come in on the payment of the assessment as specified in the programme; such payments to be secured in the same manner as the bondholders are secured for the coupons they fund. Further time than that named in the programme may be given the stockholders for the payment of the money. The time of foreclosure is wholly indefinite. Mr. Jewett further states that he found the feeling abroad to be that the road was fully worth its indebtedness; hence the claim that the stockholders who had the largest interest in its improvement should advance the capital for that purpose. Both Scotch and English bondholders, who constitute the bulk of the creditors, were satisfied with the plans adopted to secure this expectation and ensure harmony and confidence in the future administration of the property. The details of the scheme of reorganization and the estimate connected therewith are yet to be completed.

Pennsylvania.

The Centennial traffic, which is now about twice as great as in previous months, is contributing an enormous and doubtless (with the heavy trains run) a profitable traffic, which, benefiting many roads, is largest on this. A correspondent of the New York *Daily Bulletin*, writing from Philadelphia at the close of the last week, says:

"As an instance of the heavy operations upon our main roads at this time, we give a few statistics obtained from an officer of the Pennsylvania Railroad in reference to its business at this moment. On the line between Pittsburgh and New York, 700 engineers are engaged, and the number of cars between those two points is 1,030. At the depot in West Philadelphia, 110 passenger trains arrive daily, and 120 passenger trains arrive at the Centennial and Jersey City depots, each train averaging 12 cars. From Pittsburgh 15 regular express trains run daily, carrying 2,000 passengers, and, exclusive of the special excursion trains arriving from New York and way stations at the Thirty-second street depot in this city, from 12,000 to 15,000 passengers daily arrive at the Centennial depot of the company from those points. This would show an arrival of from 300,000 to 400,000 passengers per month at the latter depot alone, where on a recent occasion the officers distributed into 15 divisions 11,000 excursionists and placed them in the cars in the brief period of one hour and forty-five minutes. Notwithstanding the enormous amount of travel on the road, the immense freight business over the line has not been interfered with, and this business for the season has increased to an almost incredible amount. Every day the travel grows upon the road, and from now until the close of the Exhibition, November 10, it must increase so largely as to put its capacity to the utmost test; yet the company's arrangements and forethought are such as to leave no doubt but that the public will find no inconvenience in reaching the Centennial, or in returning from it."

So much annoyance from tramps has been experienced on the New York Division that the company has taken advantage of a New Jersey law authorizing the commission of trainmen as special policemen, with authority to preserve order and make arrests upon trains, and to arrest all persons getting upon the cars in violation of rules. Under this law the trainmen are being sworn in as policemen, and tramps getting upon freight trains are to be arrested and turned over to the police of the nearest town.

Pacific, of Missouri.

In the United States Circuit Court at St. Louis, Sept. 19, a motion was made by counsel for several stockholders to set aside the recent foreclosure sale on the ground of fraud and collusion in procuring the foreclosure.

Nashville, Chattanooga & St. Louis.

At the annual meeting in Nashville, Tenn., Sept. 14, the stockholders voted unanimously to approve the contract made by the directors with the Southern States Coal, Iron & Land Company, of England, which provides for an extension of the Jasper Branch into the Sequatchie Valley.

Weston & West Fork.

Sealed proposals for the grading, masonry, trestles and bridging of this road in sections of one mile each; also for the entire work, including track and buildings, will be received at the office of the company in Weston, Lewis County, West Va., until Sept. 29. Profiles and specifications can be seen at the office of the Chief Engineer in Weston. The road is to be of 3 ft. gauge, and will be 24 miles long, from Weston northward down the West Fork of the Monongahela to the Parkersburg Branch of the Baltimore & Ohio at Clarksburg.

Lake Erie, Alliance & Wheeling.

Tracklaying has been begun on the section of this road from Alliance, O., northward to the Painesville & Youngstown road at Southington, a distance of 40 miles. The rails are all on hand.

Atlantic & Great Western.

The Cleveland (O.) *Herald* says: "We learn that the District Court sitting in Summit County, composed of Judges Barber, McMath and Hamilton, of Cuyahoga Common Pleas, has had the important case of the United States Rolling Stock Company *vs.* the Atlantic & Great Western Railroad Company before it upon a petition in error to the Summit Common Pleas. It will be remembered that the Court of Common Pleas in June last set aside the contract on which the suit was brought, on the ground that the directors of the rolling stock company acted at the same time as directors of the railroad company in making the contract. By the contract the rolling stock company leased some 3,000 cars and locomotives to the railroad company at what was considered an exorbitant rent, and the railroad company, under its changed management, claimed that it was not bound by the rent named in the contract, but was liable to pay only the fair value of the use of the rolling stock, and the Court of Common Pleas so instructed the jury, who brought in a verdict in favor of the rolling stock company for $115,000, while its claim under the contract for rent and damages was about $2,000,000. The rolling stock company carried the case to the District Court on error. That Court, on Wednesday, gave its unanimous decision sustaining the action of the Court of Common Pleas. This decision is regarded as of the greatest importance and most valuable in its application to the management of corporations. The railroad company was represented by Messrs. Otis, Adams & Russell, and Judge Ranney, of Cleveland, and W. H. Upson, of Akron, and the rolling stock company by Mr. E. Bissell, of Toledo, and Mr. Oviatt, of Akron."

Friedensburg & Monocacy.

It is proposed to build a railroad from Friedensburg in Berks County, Pa., southward to Monocacy, on the Philadelphia & Reading road, a distance of nine miles. The road would pass through a prosperous farming region and, it is said, could be built at a moderate cost.

Duck River Valley.

It is said that this company has succeeded in purchasing iron for its road and will soon begin to lay track on the section from Columbia, Tenn., on the Nashville & Decatur road, southeast to Petersburg, 35 miles. This section has been graded some time.

Scioto Valley.

This company has had all the passenger equipment of the road furnished with Miller platforms and the Henderson Hydraulic train-brake.

Keokuk & Des Moines.

The people of Keosauqua, Ia., which is now some four miles from the line of this road, are trying to persuade the company to re-locate a portion of the line so that it shall pass through the town. It is claimed that the change would give the company a better line with lower grades than the existing road has.

In connection with the Toledo, Peoria & Warsaw this company has begun to run through coaches between Des Moines, Ia., and Indianapolis, making the run in about 24 hours. The distance is 492 miles, the train running to Indianapolis over the Cincinnati, Lafayette & Chicago and the Indianapolis, Cincinnati & Lafayette roads.

Atlantic, Mississippi & Ohio.

In the United States Circuit Court at Richmond, Va., Sept. 12, after argument, a motion was granted allowing both parties in the suit to examine the books of the company through experts. On the following day an order was entered instructing the Receivers to exercise their best judgment in relation to redeeming certain securities of the company, hypothecated as collaterals for loans advanced to the company prior to the appointment of Receivers, whenever they shall consider it to be for the interest of their trust, and not to redeem in any case when they shall consider it not to be for the interest of their trust so to do; provided, however, that in the exercise of the authority conferred upon them, the Receivers shall not increase the debt or debts in question, or change the character thereof. The Receivers were also authorized in their discretion, in lieu of actually redeeming and taking up bonds so pledged, to arrange from time to time for the extension or continuance of the loans for which the same stand pledged, either with the parties to whom the bonds are now pledged or with any other party or parties.

Texas Western.

This company is now offering for sale in New York its first mortgage 7 per cent. gold bonds. They are to be issued only at the rate of $16,000 per mile of completed road. The company has its road completed for 20 miles from Houston, Tex., and has a land grant of 16 sections per mile for the whole length of the projected line from Houston to Presidio del Norte.

Wisconsin Central.

The track on the Portage Branch is now laid to Packwankee, Wis., 52 miles south from Stevens Point and 15 miles north of Portage. The grading is nearly completed to Portage and tracklaying is still in progress. A transfer wharf and yard are being built on the Fox River at Packwankee.

Fond du Lac, Amboy & Peoria.

In the *Railroad Gazette* of Sept. 1 was published the statement of a correspondent that "work on this road has been temporarily suspended on account of the failure of payment of the contractors, Lehman & McHugh."

The contractors themselves now write to us as follows: "This is wholly untrue; Lehman & McHugh never had any difficulty. The great difficulty is that the railroad company failed to pay according to the agreement of their contract for rock excavation. There has also been some difficulty between the railroad company and the construction company, which will probably be settled in a few days and work resumed. So you see that you have done us a great injustice by the report that we had failed. We have plenty of money coming from the railroad and our laborers are all paid."

The note of our former correspondent did not mean to say that the contractors had failed, but was, unfortunately, so ambiguously worded as to be open to that interpretation.

Lehigh Valley.

The following notice was issued last week:

"On and after Sept. 10, 1876, the wages of the shop men will be reduced about 10 per cent. All extra time made at night or on Sunday will be paid for as single time. Engineers and firemen will be paid for regular trips, but no allowance for detention on road or shop time."

The wages of all trainmen and other employes all along the line have also been reduced.

West Wisconsin.

It is said that the bondholders have agreed to a plan which provides for the funding of coupons on the first-mortgage bonds up to July, 1876, the exchange of the second-mortgage bonds for preferred stock and the issue also of preferred stock for the floating debt. The first-mortgage trustee, who now holds possession of the road, is to surrender it to the company as soon as the plan is carried out. The plan was approved by the stockholders at their recent annual meeting.

Indianapolis, Bloomington & Western.

At the annual meeting in Urbana, Ill., Sept. 13, the stockholders unanimously adopted the following:

Resolved, That the thanks of the stockholders of this company are due to the Receiver, General George B. Wright, for the very successful and impartial manner in which he has administered the property, and that we recognize in his experience, judgment, prudence and integrity qualities that make him a most desirable officer of the court to have so long as the road must remain under its protection.

The Brotherhood of Locomotive Firemen.

The third annual convention of this association met in St. Louis, Sept. 13. An address of welcome was delivered by Ex-Mayor Brown, of St. Louis, and appropriately responded to by Grand Master J. A. Leach, of the Brotherhood. The Grand Master then delivered his annual address, touching upon the purposes and prospects of the order and the benefits derived from it by its members. The report of Grand Secretary Sayre showed a membership of about 3,000 men, extending over 83 roads and 43,000 miles of track. The committee on credentials reported nine officers of the Grand Lodge and 52 delegates present.

The further proceedings were private and were understood to be of much interest and importance to the order. The convention remained in session three days and, after electing officers, adjourned to meet in Indianapolis in September, 1877.

Delaware & Hudson Canal.

The New York *Journal of Commerce* says that a statement has been prepared by the officers of the Delaware & Hudson Canal Company, exhibiting the financial condition of the corporation and intended for the inspection of such of the stockholders as may be anxious respecting the safety of their property. It is not proposed by the directors to publish the exhibit in the newspapers, but it appears that the company had a surplus, after paying the last dividend in August, of about $750,000. The leased lines were operated at a loss aggregating about $1,400,000 for the past three years. The profits on coal for that period were about $2,200,000, showing a net gain of $800,000. The directors claim that the stock is worth considerably over par on their books, placing the coal lands at a fair valuation. The officers insist that there is nothing to warrant the late decline in the stock, and that the company is in a position to do a very prosperous business as soon as there shall be a general revival of trade. With respect to the New York & Canada line it appears that the road cost $8,000,000, and there were issued by the New York & Canada Company $4,000,000 of 6 per cent. bonds and $4,000,000 of stock, and all of the latter has been taken and is held by the Delaware & Hudson. The latter pay $240,000 interest on the bonds of the New York & Canada road, and this year they will receive from the net earnings of the line about half this amount, or $120,000.

Rochester & State Line.

The new contract entered into for the completion of this road is with Henry A. Taylor, of New York, who agrees to complete and equip the road, to begin work within 30 days and to prosecute it energetically. It is understood that he has the support of some of the larger creditors of the company. The city of Rochester agrees to exchange the $600,000 bonds now held by it for stock. The bonds are to be deposited with the Union Trust Company, of New York, which is to issue each month, upon certificate of an inspector to be appointed by the city of Rochester, an amount in bonds proportional to that part of the whole work completed during the previous month. If the work is not completed by Jan. 1, 1877, the City Council may, at its discretion, suspend the delivery of the bonds. If the work is not begun within 30 days, or if it is not completed by July 1, 1877, the contract is to be forfeited.

Chicago, Clinton & Western.

At Iowa City, Sept. 7, the Receiver let the contracts for grading that end of the line, the first nine miles from Iowa City, to W. Ferguson & Co., and the next seven miles to C. Wright & Co. The 16 miles are to be completed by Nov. 10. The remaining contracts were to be let this week.

Creston & Sioux City.

The town of Greenfield, Adair County, Ia., has voted a 5 per cent. tax in aid of this projected road. Several other towns are to vote on the same question soon.

North Pacific Coast.

Construction trains are now running to Freestone, 10 miles northward from the old terminus at Tomales, Cal., and the tracklayers are at work beyond. Much of the grading between Freestone and the Russian River is done and the company hopes to run cars through this year.

Pittsburgh & Castle Shannon.

It is proposed to extend this road from Castle Shannon, Pa., the present terminus, southward to Washington, there to connect with the Waynesburg & Washington road, now under construction. The distance is about 24 miles. Several meetings have been held along the line and a canvass is to be made to see what subscriptions can be secured. There is already one line between Pittsburgh and Washington.

Brownsville & New Haven.

The contract for grading the first division out of Brownsville, Pa., has been relet and work recommenced. The grading on the second division is nearly done, except one heavy cut.

Arkansas Central.

At Amsterdam, where $400,000 of the 8 per cent. bonds of this company are held, a meeting of the bondholders was held Sept. 5, notice having been received that there would be a foreclosure sale at the end of this month. At this meeting a Mr. Ziegelaar, one of the Dutch members of the recently dissolved London committee, proposed that a Mr. Huntington, of London, who was to sail on the 6th for New York, be commissioned to care for the bondholders, which he would undertake to do

if they would contribute £500 for the expenses. This was agreed to, the Dutch bondholders contributing $2.40 per bond. The Credit Foncier, of Paris, which holds a large part of the bonds (hypothecated), and some London holders join in the movement.

The latest accessible financial statement of this company gives the amount of first-mortgage bonds (8 per cent. gold) as $620,000, and of second-mortgage bonds (7 per cent. gold) as $700,000. No interest has been paid since 1873. It has 48 miles of narrow-gauge railroad, and to pay the interest requires net earnings equivalent to a little more than $2,000 gold per mile. Earnings have not been reported since February, 1873. For the year ending with that month they were $35,918.

Galena & Southern Wisconsin.

This road suffered very much from the heavy rain storms of last July. The road-bed was washed badly in many places, bridges and culverts carried away and it was left in such a condition that the repairs almost amounted to a rebuilding of the road. The work of reconstruction is now completed and trains are running regularly between Galena, Ill., and Platteville, Wis.

Great Western, of Canada.

At a special meeting of the preference shareholders in London, England, Aug. 31, it was unanimously voted to consent to the exercise of the powers given to the directors by the Canadian act of 1876, by capitalizing the whole of the dividends in arrears on the preference stock to July 31, 1876, and, if necessary, of any deficiency up to Jan. 31, 1877, by the issue of the same description of preference stock at par.

Delaware, Lackawanna & Western—Morris & Essex Division.

The western approach to the new tunnel through Bergen Hill is now nearly completed. The smaller bridges are all in place, most of the track is laid east of the Hackensack River and on the new line of the Boonton Branch. The east abutment of the new bridge over the Hackensack River, which sunk sometime since, has been rebuilt and the eastern fixed span is now being erected. The western fixed span and the draw span have been up some time. West of the Hackensack one track is laid and the filling in of the trestle on which the track was built is nearly done; the second track is now being laid. The eastern approach to the tunnel is also well advanced. The bridges are all up and much of the grading is done, and the new coal trestles are nearly all finished. It is said that the present passenger depot at Hoboken will be retained for a time. The building of a new passenger depot and the establishment of a new ferry to New York, both of which were proposed, will probably be postponed for a time.

On the tunnel itself good progress is being made on the arching, which will be carried through nearly the whole length of the tunnel, which is 4,720 feet long. It is expected that the ventilation will be better than that of the Erie tunnel, there being six shafts extending to the surface. The largest of these has a diameter equal to the width of the tunnel, and is about 90 feet deep from the top of the hill to the floor of the tunnel; the others are of smaller diameter and vary from 75 to 90 feet in depth.

Work is in progress on the new bridge over the Passaic at Newark, where a considerable force of men is at work putting in the foundation for the new piers. The stone for the piers is being piled up on either side of the river; most of it is stone which has been taken out of the Bergen tunnel. This work proceeds somewhat slowly, as it has to be done without disturbing travel over the existing bridge. The work of replacing three of the old wooden bridges in East Newark with iron is also in progress.

Springfield & New London.

The Springfield (Mass.) *Union* says: "The matter of the closing of this road is to be brought at once before the Railroad Commissioners of this State, on petition from the Connecticut Central Railroad, under the law of 1874, asking the Commissioners either to compel the Longmeadow road to haul the Central's trains into and out of Springfield, or to grant the Central the right to pass over the Longmeadow road, the compensation therefor to be fixed, in either case, by the Commissioners. It has been supposed that the Central, being a Connecticut corporation, had no right of petition to the Massachusetts Commissioners, but the act referred to expressly grants that right to all companies whose tracks run to Massachusetts State line and connect with Massachusetts roads. Thus, if the companies are bound to fight among themselves, it is a good thing that public authority should be summoned to force them to come to terms. In fact, however, the directors of the Longmeadow road have the power to reopen the road whenever they shall choose to do so. The new lease of their road to the Connecticut Valley (which is merely the old lease continued with the rental reduced), requires the lessees of the road to run two trains over it each way daily. By their failure to comply with requirement, the lawyers say they have forfeited the lease."

Geneva & Southwestern.

It is said that the complications which have delayed work on this road have been arranged, and that work will soon be begun and continued until the road is completed from Geneva, N. Y., southwest to the Northern Central crossing at Stanley Corners, about seven miles. This section will probably be used by the Northern Central coal trains, at least for so much of the business as is bound to Geneva and points east. The road beyond Stanley Corners to Naples will probably have to wait until next year.

Sonoma.

The work of building this road from Sonoma, Cal., to the Embarcadero on Sonoma Creek, about 2 miles, is nearly completed. A meeting of the parties interested was held recently to consider the question of extending it to Santa Rosa, about 21 miles from Sonoma. The road is built on the prismoidal or one rail plan.

Texas Transportation Company.

This company's road, which is to connect the railroad lines entering Houston, Tex., with Clinton, the head of the new channel on Buffalo Bayou, and the landing place of the Morgan steamship lines, is now nearly completed and will probably be ready for traffic this month. It is 7¼ miles long, and is being built is a very substantial manner and laid with steel rails. Three engines have been received for the road.

Railroad Mail Service Compensation.

The commission to examine into and report on the railroad mail service and the compensation paid for it met in New York, Sept. 12. Statements were presented by representatives of the New York Central and Hudson River and the Erie. The commission will remain in New York several days and will receive statements from other companies concerned. The evidence thus far received is to the effect that the present rates are entirely too small to pay the companies for the service given.

Lockport & Buffalo.

This company has recently made arrangements to build its road, and a number of bids have been received from contractors. The line is from Lockport, N. Y., westward to Tonawanda, 13 miles, connecting at the latter place with the Niagara Falls Branch of the Erie. The work, however, may be delayed, as several tax-payers of Lockport have applied to the Supreme Court for an injunction to restrain the company from selling or transferring and the city from paying interest on $100,000 Lockport bonds, on the proceeds of which the company relied for a large part of the money needed. These bonds were voted several years ago, but were not delivered to the company until last month, and the applicants take the ground that their issue was illegal, as the present Constitution of New York prohibits all municipal aid to railroads. The friends of the road hold that the case does not come within the prohibition, as the bonds were voted sometime before the present constitution was adopted. The Court has granted the usual preliminary injunction and order to show cause why it should not be made perpetual.

Southern Pacific.

The San Francisco *Bulletin* thus speaks of the new line to Los Angeles and its recent opening: "The line passes through the entire length of the broad valley of San Joaquin from its northern extremity at Lathrop (where the road branches off from the Central Pacific) to its head at Tehachape. Between these two points, a distance of about 300 miles, the road is almost a dead level. The work of tracklaying was comparatively inexpensive, no more formidable obstacles presenting themselves to the engineers and road makers than a few bridges over the Stanislaus, the Tuolumne, the Merced, the Fresno, the Kern, and other streams flowing from the Sierra Nevada to the San Joaquin River. This section of the road, which is known as the San Joaquin Valley Railroad, intersects San Joaquin, Stanislaus, Merced, Fresno, Tulare and Kern counties. It forms also the great highway over which the products of Tuolumne and Mariposa counties likewise find their way to market.

"The Sierra Nevada runs parallel with the great valley, in a southeasterly direction, until almost due east of the town of Bakersfield, the county seat of Kern County. There the range make a sudden divergence to the southwest, while the Coast Range makes a divergence to the southeast, both uniting and forming a barrier across the head of the valley in the form of a horse shoe. The only natural passes through this horse shoe to the country beyond are the Tehachape Pass (about the middle of the bend) and Tejon Pass, several miles further west. It is through the latter that the old Los Angeles stage road runs. The former was, however, adopted by the railroad engineers as the easiest pass through which to carry a railroad. This point is where the most formidable obstacles presented themselves to the railroad engineers. The manner in which the elevation of the Sierra Nevada at Tehachape has been overcome has been graphically described in these columns. Having crossed the Sierra Nevada the road debouches on to the Mohave Desert, which is hemmed in on the south by the range sprouting out of the union of the coast range and the Sierra Nevada, and which, like the latter, extends in a southeasterly direction, and is known as the Sierra Madre.

"From the northeastern flank of the Sierra Madre another range juts out and runs in an almost easterly direction, forming a barrier between the two great deserts of Southern California—the Mohave and the Colorado. The Sierra Madre forms the dividing wall between these deserts and the fertile, semi-tropical counties of Los Angeles, San Bernardino and San Diego.

"The difficulties to surmount before this land of the orange and the olive was reached were, consequently, not all overcome when the summit of the southern Sierra Nevada was crossed. Fortunately the formation of the upper Sierra Madre at San Fernando, the point at which this range is pierced, was favorable for tunneling, consisting of sandstone and other soft sedimentary rock. The work of boring this tunnel was carried on from both sides of the range, and although the longest tunnel on this side of the continent, it has been satisfactorily completed with more than average expedition. The country lying between San Fernando on the south side of the Sierra Madre and Tehachape Pass is broken and barren. Sage brush and cactus are its chief vegetable growth where there is sufficient soil and moisture for the roots of vegitation to obtain a firm hold and sufficient nourishment. It is in this desolate region that the ceremony of laying the last rail was performed Tuesday, a description of which follows. * * *

"At Tehachape the track winds its way up the steep mountains in sinuous folds that overtop each other in successive terraces. Every artifice has to be employed to enable the engine to climb the steep grade, and within 19 miles there are 17 tunnels in ascending this Tehachape Canon. A few statistics regarding the length and size of these tunnels cannot prove uninteresting. Tunnel No. 1 is 245.8 feet long; No. 2, 232.2 feet; No. 3, 707.7 feet; No. 4, 257 feet; No. 5, 1,156.3 feet; No. 6, 303.7 feet; No. 7, 532.7 feet; No. 8, 690 feet; No. 9, 426.2 feet; No. 10, 406½ feet; No. 11, 158⅝ feet; No. 12, 756¼ feet; No. 13, 513¾ feet; No. 14, 512.7 feet; No. 15, 360.7 feet; No. 16, 262.5 feet; No. 17, 260¾ feet; making a total of 7,683¾ feet. Nearly all these tunnels are heavily timbered with staunch 11x14 inch redwood timbers. At the bottom they are 14 feet in the clear, or 16½ feet in excavation. They are 22 feet in height, and the shoulders at the springing of the arch are 18 feet 4 inches. In the Soledad Canon there are two more tunnels, numbered 18 and 19, the first being 264 feet long, and the latter 332 feet. The longest tunnel on the coast is the San Fernando tunnel, 6,966½ feet in length.

"This triumph of engineering skill was commenced on March 27, 1875, the heading met July 14, 1876, and the timbering was completed Aug. 9, 1876. It is built on a slope of 37 feet to the mile, and is perfectly straight, so that one can see through it. Tunnel 9 is at the famous loop of Tehachape Pass. This loop completely encircles a mound, and by so doing gains a difference in elevation of 77 feet. Emerging from Tunnel 9, the train winds around the mound and passes directly over the tunnel at right angles, having made a curvature of 300 feet. The length of the loop is 3,794 feet. Pictured on the map this loop looks like a coil thrown carelessly in a rope; it is a veritable corkscrew. It is claimed to be a novel and original achievement in engineering. The total length of tunnels between Caliente and Los Angeles, as given above, is 15,246.4 feet. Taken as a whole, the difficulties of engineering in ascending the Tehachape Canon surpass everything encountered in an equal distance on any portion of the Sierra Nevada. * *

"At the culminating point, Lang's Station, the Los Angeles delegation, including the Mayor and leading officials and citizens, were in waiting when we arrived. A thousand workmen were drawn up in line with picks and shovels on either side of the track, the track-layers on either end of the unfinished portion standing ready for the signal. A thousand and fifty feet of track was to be laid, an equal portion being allotted to each set of track-layers. All was eagerness and enthusiasm, greetings being interchanged between the delegations from the two cities. The General Manager of the Atlantic & Pacific Telegraph line had established an office, and wires connected Los Angeles and San Francisco. Frank Frales, a well-known Central Pacific workman, had charge of the southern gang of workmen, and when his men won the race laying the road by five minutes the cheers were loud and prolonged. The last spike is of gold and beautifully inscribed. The hammer is of silver, and is of the form of the usual spike maul. The handle is of Los Angeles orange, and the total weight is two and a quarter pounds. Its value is $60, and the value of the spike is $180. L. W. Thatcher, of Los Angeles, formerly a conductor on the Central Pacific, presented both for the occasion. Charles Crocker, the President of the road, made a beautiful and eloquent speech, and at its close he drove the spike amid deafening cheers. Even the Asiatics joined in the shouts of rejoicing."

The ceremony of driving the spike was followed by speeches from Vice-President Colton, ex-Gov. Downey and the Mayors of San Francisco and Los Angeles. The occasion was further celebrated by a grand banquet at Los Angeles on the evening of the same day, Sept. 5, at which other speeches were made.

Of the running of trains the *Bulletin* says: "According to the proposed time schedule express trains will leave San Francisco daily via Oakland Ferry at 4 p. m.; will pass Lathrop at 8:15 p. m., and arrive at Los Angeles on the next day at 3:30 p. m. Sleeping cars will be run from Lathrop to Los Angeles. Emigrant and through freight trains will leave San Francisco daily at 3 p. m., will pass Lathrop at 11:15 p. m., and arrive at Los Angeles at 11:30 a. m. of the second day. Returning, trains will leave Los Angeles daily at 12 noon, express, and 8:30 p. m. emigrant, arriving in San Francisco at 12:35 p. m. and 6:05 a. m., respectively.

"Local trains will leave Los Angeles daily at 4 p. m. for Colton, (San Bernardino, three miles distant); at 4:15 p. m. for Wilmington, and at 4:30 p. m. for Anaheim, making close connections with express trains from San Francisco.

"On Mondays, Wednesdays and Saturdays trains will leave Los Angeles at 4 o'clock p. m. for Indian Wells (end of track on Yuma Division), making close connection same night with the California and Arizona stages for Ehrenberg, Prescott, Tucson and other points in Arizona.

"A new station called Newhall is 32 miles north of Los Angeles, and here the stages of the Coast Line Stage Company will make a direct connection from trains for San Buenaventura, distant 50 miles further. Stages of the same company will make direct connection at Anaheim for San Diego, distant 110 miles.

"At Mojave stages depart for Lone Pine, Cerro Gordo and Independence.

"Through distances from San Francisco are as follows:

"Lathrop, 82 miles; Mojave, 370 miles; Newhall, 438 miles; San Buenaventura, 488 miles; Santa Barbara, 518 miles; Los Angeles, 470 miles; Wilmington, 492 miles; Anaheim, 496 miles; San Diego, 606 miles; Colton, 528 miles; Indian Wells, 600 miles. Colorado River, 715 miles."

Atlantic & Pacific.

Notice is given that all persons interested in the securities of this company, who desire to participate in the organization of the new St. Louis & San Francisco Railway Company, in accordance with the plan adopted by the Atlantic & Pacific bondholders' committee, must signify such desire prior to Sept. 30, 1876, and all subscriptions to the securities of the new organization made under said plan must be settled on or before Oct. 14, 1876, or the privilege of participation will be forfeited. Notices must be sent to A. Peirce, No. 3 Broad street, New York.

Connecticut & Passumpsic Rivers.

Notice is given that holders of bonds due Dec. 1, 1876, can exchange the same at the Treasurer's office in Boston for the 7 per cent. first-mortgage bonds payable in 1893, at any time prior to Oct. 1, 1876.

Springfield & New London.

The questions as to the operation of this road in connection with the Connecticut Central and the re-establishment of the line between Saybrook and Springfield are to be submitted to the Massachusetts Railroad Commissioners for arbitration.

Emlenton & Shippenville.

The grading of this road is completed from Emlenton, Pa., to Turkey Run, and the track is laid from Emlenton north by east five miles. Between Turkey City and Edenburg grading has not been begun. There are now two engines and a number of cars on the road.

Train Accidents in August.

About the first minute of the first hour of the 1st, at Homer, Ill., on the Toledo, Wabash & Western road, as a passenger train was backing into a siding, the switch became loose and a car was thrown across both tracks, delaying trains two hours.

On the 1st two cars of a freight train on the Ohio & Mississippi road ran off the track in East St. Louis, Ill., injuring a brakeman.

On the morning of the 3d a freight train on the Chicago, Rock Island & Pacific road ran into some cars which the switching engine had left for a few minutes on the main track at Joliet, Ill. One car was wrecked, three others and the engine damaged.

On the afternoon of the 4th as a freight train was putting some cars on a siding at Woodmont, Conn., on the New York, New Haven & Hartford road, the brakes failed to hold, and a flat car went off the end of the siding and into the depot building, knocking out one end of it.

On the 4th a freight train on the Pittsburgh, Titusville & Buffalo road was thrown from the track near Hydetown, Pa., wrecking several cars, killing a brakeman and injuring four others.

On the evening of the 4th two cars of a freight train on the Erie Railway were thrown from the track by a broken axle near Otisville, N. Y.

On the 6th a freight train on the Vermont & Massachusetts Division of the Fitchburg Railroad was halted near West Fitchburg, Mass., where some section men were laying new rails. A brakeman was sent back to flag a following freight, but he stuck his flag in the ballast, sat down beside the road and fell asleep. The flag was blown down and the second train ran into the rear of the first, wrecking an engine and five cars and injuring a brakeman.

Early on the morning of the 7th an express train on the Louisville, Cincinnati & Lexington road was thrown from the track by the spreading of the rails on a curve near Glencoe, Ky. The whole train left the track, the engine and two forward cars going down a high bank and the three rear cars turning over on their sides. Seven persons were somewhat injured besides a number slightly bruised.

On the morning of the 7th five cars of a ballast train on the Intercolonial Railway were thrown from the track near Coal Branch, N. B., by a broken wheel. A brakeman was injured.

On the afternoon of the 7th an engine of the St. Louis, Keokuk & Northwestern road ran off the track at the Hannibal & St. Joseph junction in Hannibal, Mo.

On the 9th four cars of a freight train on the Toledo, Wabash & Western road were thrown from the track near Attica, Ind., by a hog which had gotten upon the track.

On the evening of the 9th a car of a peach train on the Philadelphia, Wilmington & Baltimore road was thrown from the track at Delaware Junction, Del., by the breaking of a truck.

On the evening of the 9th the engine and two cars of a freight train on the Central Railroad of New Jersey were thrown from the track by a misplaced switch on the long bridge over Newark Bay, near Elizabethport, N. J. The engine broke through the ties, but was held up by the stringers and guard rails and did not reach the water. The engineman was slightly hurt and the road was blocked all night.

Early on the morning of the 10th a passenger train on the Lake Shore & Michigan Southern road struck a switch which had been purposely misplaced at Lake View, N. Y., and the engine was thrown from the track, injuring the engineman and fireman. As was subsequently discovered, the man who misplaced the switch succeeded in wrecking another train on the same road a few days later and was afterwards detected in an attempt to wreck an express train on the New York Central.

On the morning of the 10th a train on the Vermont & Massachusetts Division of the Fitchburg road ran off the track in Greenfield, Mass., blocking the track several hours.

Very early on the morning of the 11th several cars of a stock train on the Lake Shore & Michigan Southern road ran off the

track in East Buffalo, N. Y., and one of them upset and was badly broken, killing several head of stock.

Early on the morning of the 11th just after a passenger train on the Lake Shore & Michigan Southern had passed through the yards at Cleveland, O., a switchman signalled a freight train to come out of a siding. The signal was seen and obeyed by two trains instead of one and the second struck the rear of the first just as it came upon the main track, wrecking four cars and damaging an engine.

On the morning of the 11th a car in a freight train on the Philadelphia, Wilmington & Baltimore road ran off the track at Edgewood, Md., blocking the track an hour.

Early on the morning of the 12th, a freight train on the Central Railroad of New Jersey ran into the rear of a preceding freight at Roselle, N. J., wrecking an engine and several cars loaded with oil. The oil caught fire and the wreck was almost entirely destroyed, burning the ties, warping and twisting the rails and blocking both tracks for several hours. There was a thick fog at the time of the collision.

Early on the morning of the 13th, a freight train on the Washington City, Virginia Midland & Great Southern road ran into a gap where a culvert over Jennings Creek, near McIvor's, Va., had been washed out during a heavy rain storm. The engine went down into the gap and nine cars were piled up on top of it and wrecked. The engineman and a brakeman were killed and the fireman hurt.

On the 14th, a car in a freight train on the Pennsylvania Railroad was thrown from the track by a broken axle in Elizabeth, N. J., blocking the track three hours.

On the 14th, a passenger train on the Burlington, Cedar Rapids & Northern road ran into two gravel cars, which had been left on the main track near Wapello, Ia., wrecking them and blocking the track two hours.

On the night of the 14th there was a butting collision between two freight trains on the Erie Railway near Linden, N. Y., by which some damage was done. The engineman of one of the trains reversed and jumped, and his train after the collision started backwards without a person on board, but stopped after running several miles, the steam having run down.

On the night of the 14th, as a train on the Keokuk Branch of the Chicago, Burlington & Quincy road was near Patterson, Ia., a connecting rod of the engine broke, tearing up the running board.

Early on the morning of the 15th the boiler of an engine on the Baltimore & Ohio road exploded while standing on the track in the Locust Point yard in Baltimore. The boiler appears to have given way about the junction of the barrel with the fire-box and the front part was thrown forward some distance, the fire-box end being thrown back upon the tender. The engine had been thoroughly repaired eight months before and the steam gauge indicated 106 pounds a few minutes before the explosion. The engineman was hurt so that he died in a few hours and a laborer who stood near was also injured.

On the morning of the 15th an engine in the Vandalia Line yard at East St. Louis, Ill., ran into the rear of a freight train, damaging the caboose slightly.

On the morning of the 15th there was a butting collision between a gravel and a mixed train on the Intercolonial Railway near Campbellton, N. B., by which several cars were wrecked and a trainman hurt.

Near noon on the 15th a south-bound express train on the Baltimore & Potomac road ran over a misplaced switch and into the head of a ballast train which was standing on a siding at Winans, Md. Both engines and a baggage car were wrecked, the fireman of the express injured so that he died two days afterwards; the engineman and a brakeman were badly hurt. The conductor of the ballast train had remained with a gang working on the track when he sent his train to the siding to clear the express, and none of the other men on the train appear to have thought of closing the switch.

Early on the morning of the 16th an express train on the Lake Shore & Michigan Southern road was thrown from the track near North East, Pa., at a place where the fastenings of a rail had been removed and the rail displaced with intent to wreck the train. The engine and four cars went down a high bank, the engine and mail car upsetting. But one passenger was hurt and he died the same day. It was subsequently discovered that the rail was removed by the same man who misplaced a switch and wrecked a train on the same road several days before.

Near noon of the 16th a wild engine on the Williamsburg Branch of the Pennsylvania road ran into a lot of cattle near Frankstown, Pa., and was thrown from the track. The engineman and fireman jumped and were slightly hurt.

On the afternoon of the 16th about seven miles south of Galesburg on the Chicago, Burlington & Quincy road, a section foreman took up some rails without putting out a signal. A freight train came up and the engine and 16 cars were wrecked, blocking the road 10 hours. The engineman was badly bruised.

On the afternoon of the 16th as an express train from Boston over the Shore Line was standing at the depot in Providence, R. I., two cars cut loose from a freight train came down the track and struck the rear end of the express, damaging several cars. There were two brakeman on the freight cars but they failed to stop them in time.

On the afternoon of the 16th two cars of a local train on the Lake Shore & Michigan Southern road were thrown from the track in Chicago, Ill., by a misplaced switch.

On the evening of the 16th an express train on the Great Western Railway ran into the rear of a freight which was just going into a siding at London, Ont. The express engine and two freight cars were badly broken and the engineman hurt.

On the evening of the 16th a freight train on the Indianapolis & St. Louis road ran off the track at Bunker Hill, Ind., blocking the road seven hours.

On the morning of the 17th there was a butting collision between a passenger and a freight train on the Ohio & Mississippi road at Moore's Hill, Ind. Both engines and several cars were badly broken, the firemen of the passenger train fatally and the engineman less severely hurt.

A little after noon on the 17th there was a butting collision between a passenger and a freight train on the Nashville, Chattanooga & St. Louis road near Raccoon Mountain, Tenn. Both engines and several cars were badly damaged, a boy, who was stealing a ride, killed and two trainmen hurt.

On the afternoon of the 17th, as a passenger train on the Intercolonial Railway was near Rothesay, N. B., the coupling of the rear car broke and fell upon the rails, throwing the car from the track.

On the evening of the 17th an express train on the Evansville & Crawfordsville road struck a cow near Fort Branch, Ind., and the whole train was thrown from the track, the engine being badly wrecked, the engineman fatally and the fireman badly hurt.

Late on the night of the 17th a wheel broke under a car in a peach train on the Amboy Division of the Pennsylvania Railroad, near Bordentown, N. J., and 11 cars went into the ditch and were badly broken, killing a brakeman and blocking the road 10 hours.

On the evening of the 18th three cars of a freight train on the Cairo & St. Louis road ran off the track near Cairo., Ill., and were badly broken, blocking the road three hours.

Late on the night of the 20th a train on the Brooklyn, Bath & Coney Island road was thrown from the track at Gravesend, N. Y., by a misplaced switch, blocking the road three hours.

Very early on the morning of the 22d nine cars of a freight rain on the Chicago & Iowa road were thrown from the track near Sugar Grove, Ill., and some of them were badly broken. The accident is said to have been caused by a stone falling from a flat car upon the track.

On the afternoon of the 22d, as a freight train on the Newark & New York Branch of the Central of New Jersey was running into the yard at Newark, N. J., the engine having been detached, it struck a horse car at the Mulberry street crossing of the road. The horse car was pushed along some 50 feet, when it stuck fast and the first car of the freight train was thrown from the track and the car body lifted from the trucks, crushing the horse car.

On the evening of the 22d an express train on the Chicago & Northwestern road was thrown from the track by a misplaced switch at Dunlap, Ia., and the engine upset into the ditch, blocking the road five hours.

On the night of the 22d a passenger train on the Macon & Brunswick road struck a cow which had got fast in a trestle near Station No. 13, Ga. The engine and two cars left the track and the engine fell from the trestle and was badly broken, killing the engineman.

Very early on the morning of the 23d a culvert on the New Orleans, St. Louis & Chicago road, near Tugaloo, Miss., which had been badly washed during a violent thunder storm, gave way under a passenger train and three cars went into the gap and were wrecked. A tramp, who was stealing a ride, was killed, two passengers were mortally hurt and 10 less severely injured.

Early on the morning of the 23d an axle broke under a car of a south-bound freight train on the Philadelphia, Wilmington & Baltimore road at Stemmer's Run, Md., and that car and those following it were thrown from the track, the wreck being piled up over both tracks. There were on two flat cars in the train two narrow-gauge passenger cars from Wilmington, in one of which was a lighted oil lamp, from which the wreck caught fire and the two narrow-gauge cars and 14 freight cars were destroyed. The man in charge of the new cars and another were slightly hurt.

Soon after the accident a north-bound freight came up and was compelled to stop some four hours until its track was cleared. Just as this work was done and the freight was ready to start, a north-bound mail train came up at high speed and ran into the rear of the freight, wrecking four cars, damaging its own engine badly and injuring three trainmen and three passengers slightly.

On the morning of the 23d the engine and two cars of a passenger train on the Kansas City, St. Joseph & Council Bluffs road was thrown from the track by the spreading of the rails at Missionary Bottom, Mo. The engine upset in the mud and was badly damaged, and the engineman was caught in the wreck and scalded so that he died in a few hours. The ground at that point is very wet and marshy, so that the track is constantly sinking.

About noon on the 23d, near Clayton, Ill., on the Toledo, Wabash & Western, a passenger train struck a cow, ditching the engine and throwing the whole train off. Trains were delayed 10 hours.

Near noon on the 23d the engine and five cars of a freight train on the Dunkirk, Allegheny Valley & Pittsburgh road ran off the track at Jackson Run, Pa., wrecking the cars and injuring the fireman fatally.

On the afternoon of the 23d there was a butting collision between a west-bound passenger and an east-bound freight train on the Montpelier & Wells River road, near East Montpelier, Vt., by which both engines and several cars were wrecked, the conductor, baggage-master and two passengers hurt. The passenger train was 45 minutes late and was running on the freight train's time.

On the evening of the 23d on the Quincy Branch of the Hannibal & St. Joseph road, near Palmyra, Mo., three cars of a freight train were ditched, delaying trains 10 hours. The accident is supposed to have been caused by a brake dropping on the track.

Very early on the morning of the 24th as a long coal train on the Philadelphia & Reading road was going slowly up a grade at Mount Carbon, Pa., a freight train came rapidly around a curve and ran into its rear wrecking the caboose and six coal cars and killing a brakeman. The freight had been ordered ahead at Schuylkill Haven and informed that the coal train was 18 minutes in advance of it. A sharp curve prevented the freight engineman from seeing the coal train lights until he was close upon them.

Near noon on the 24th a local freight train on the Boston & Albany road ran into the rear of a through freight near Chatham, N. Y. Two cars were wrecked, the engine badly damaged and a fireman severely injured.

On the night of the 24th an oil car in a train on the East Pennsylvania Branch of the Philadelphia & Reading road caught fire from a hot box when the train was near Blandon, Pa., and six oil cars were entirely destroyed. The great heat of the fire warped and twisted the rails for some distance and burned the ties.

On the 25th the tender and two cars of a train on the Central Railroad of Georgia were thrown from the track and wrecked near McIntyre, Ga., by the breaking of an axle under the tender.

On the night of the 25th a car of a coal train on the Hawley Branch of the Erie Railway jumped the track near Millville, Pa., and was followed by 23 more, the whole being piled up in a bad wreck.

On the night of the 26th an express train on the Cincinnati, Hamilton & Indianapolis road ran into some freight cars which had been blown by a high wind from a siding upon the main track at Griffin, Ind. The engine and the loose cars were badly broken. The engineman and fireman jumped and were somewhat hurt.

On the morning of the 28th a Chicago & Alton engine jumped the track on the approach to the Illinois & St. Louis Bridge in East St. Louis, Ill.

On the 28th 12 cars of a freight train on the New York Division of the Pennsylvania Railroad ran off the track at Germantown Junction in Philadelphia.

On the afternoon of the 28th, at Independence, Ill., on the Toledo, Wabash & Western road, an engine and 15 cars of a freight train were thrown from the track by a misplaced switch, delaying trains 12 hours. The switch is supposed to have been maliciously misplaced.

On the afternoon of the 29th the engine of an express train on the Central Pacific Railroad was thrown from the track near Palisade, Nev., by a misplaced switch. Little damage was done, but the train was delayed some three hours. The switch is believed to have been purposely misplaced by two tramps who had been put off a preceding train near by.

On the evening of the 29th a freight train on the New York & Oswego Midland ran off the track near Morsston, N. Y., damaging the engine and several cars, injuring the engineman slightly and blocking the road five hours.

On the evening of the 29th, as a west-bound passenger train on the Central Railroad of New Jersey was crossing the east-bound track to go upon the track of the Long Branch Division at Elizabethport, N. J., an east-bound freight struck the rear car and damaged it somewhat. The freight engineman jumped and was badly hurt.

On the night of the 29th a passenger train on the Cleveland, Columbus, Cincinnati & Indianapolis road ran into a washed out culvert near Lagonda, O., and the engine and baggage car were wrecked.

On the 30th, as a freight train on the Grand Junction Branch of the Boston & Albany was near East Somerville, Mass., one of the cars left the track and dragged the following cars after it, most of them being piled up in a bad wreck at the foot of a low bank. Some of the wreck was thrown upon the adjoining track of the Eastern Railroad, blocking that also for four hours. A brakeman was killed and another badly hurt. The cause is believed to have been a broken axle.

On the night of the 30th there was a butting collision between two freight trains on the Michigan Central road at Francisco, Mich. Both engines were badly damaged and several cars wrecked. One box car was thrown over upon the telegraph office and knocked it down.

Very early on the morning of the 31st a freight train on the Michigan Central ran into the rear of a preceding freight which was standing on the track at Decatur, Mich., wrecking the caboose and one other car, killing one woman who was in the caboose and injuring another. There was a dense fog at the time and the second freight was running very fast to get out of the way of a following express train.

On the morning of the 31st the second section of a long excursion train on the Western Maryland road ran into the rear of the first section which was taking water at Smithsburg, Md. One car was somewhat damaged.

On the morning of the 31st, as the mail train bound south on the Rutland Railroad was near Charlotte, Vt., an axle broke under the tender and the tender and two baggage cars were thrown from the track. Both cars went down a bank 20 feet high and one of them turned completely over and was badly broken. The express messenger and conductor were slightly hurt and the road was blocked several hours.

On the morning of the 31st a wheel broke under a passenger car in a train on the Charlotte, Columbia & Augusta, near Graniteville, S. C. Two cars were thrown from the track and badly broken and a passenger was killed.

On the afternoon of the 31st there was a butting collision between an express train and a wild engine on the Eastern Railroad near Newburyport, Mass. Both engines were badly broken and the track blocked three hours. A man who was riding on the express engine was badly hurt. The express was half an hour late and trying to make up time; the wild engine had had orders to run to Newburyport and meet the express there, but it does not appear whether the express had been notified properly of this order.

On the night of the 31st, a bridge on the Cairo & St. Louis road, near Waterloo, Ill., gave way under a freight train, and five freight cars and the caboose fell 35 feet into the river below, wrecking them completely, injuring two trainmen fatally and a passenger badly.

On the night of the 31st, a freight train on the Toledo, Peoria & Warsaw road ran off the track near La Harpe, Ill., blocking the road two hours.

On the night of the 31st the engine of a freight train on the Intercolonial Railway ran off the track near Folly Mountain, N. S. A brakeman was slightly hurt.

Late on the night of the 31st, as an express train on the Lehigh Valley road, drawn by two engines, was near Laury, Pa., an axle broke under the tender of the second engine, throwing it, the baggage and two passenger cars from the track and down a bank into the Lehigh River. The cars were wrecked and 12 passengers hurt, only two of them badly.

This is a total of 78 accidents, whereby 22 persons were killed and 76 injured. Eighteen accidents caused the death of one or more persons, 21 caused injury but not death, while 37 or 47.5 per cent. of the whole caused no injury serious enough for record. The proportion of accidents causing death or injury was unusually large.

These accidents may be classified as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	14	
Butting collisions	8	
Crossing collisions	1	
		— 23
DERAILMENTS:		
Unexplained	15	
Misplaced switch	7	
Broken axle	7	
Cattle on track	5	
Accidental obstruction	4	
Wash-out	3	
Spreading of rails	2	
Broken wheel	2	
Broken truck	2	
Rail removed for repairs	1	
Rail maliciously removed	1	
Broken bridge	1	
Loose switch	1	
Running off end of siding	1	
		— 52
Boiler exploded		1
Broken connecting rod		1
Car burned while running		1
Total		78

Three collisions were caused by neglect to use or observe signals, two each by fog and by cars left standing on main track, one each by a misplaced switch, by mistake in orders and by cars blown out of a siding. Three switches were purposely misplaced, which, with a rail maliciously removed, makes four known cases of train wrecking, two of which were subsequently traced to the same man. Twenty accidents were caused directly by defect or failure of road or equipment.

As compared with August, 1875, there is a decrease of 37 in the number of accidents, a decrease of five in the number killed, and a decrease of 34 in that injured.

The features of the record for the month are an unusual number of collisions, especially of butting collisions, and an unusual number of broken axles for a summer month. There are few wash-outs and no land-slides, which is not commonly the case in August, a month in which sudden and violent storms are generally more frequent than at any other season. Accidents from cattle on track are not more numerous than is usual at this season. Of the broken bridge recorded we have no definite account except that it was a wooden bridge and believed to be in good condition.

For the year ending with August the record is as follows:

	No. of accidents.	Killed.	Injured.
September	116	50	182
October	88	12	74
November	87	24	97
December	84	12	63
January	60	8	29
February	91	15	68
March	109	30	95
April	56	6	47
May	64	13	116
June	52	19	73
July	79	17	69
August	78	22	76
Totals	964	228	988

The averages per day for the month were 2.52 accidents, 0.71 killed and 2.45 injured; for the year they were 2.63 accidents, 0.62 killed and 2.70 injured. Except in the number killed the yearly averages are above those for the month. The average casualties per accident were for the month 0.282 killed and 0.974 injured; for the year 0.237 killed and 1.025 injured.